Phipps SEIS Public Meeting – Comment Sign Up Sheet

Name: STEN R. LILJA

Address: 1330 N. OCEAN BLVD
PALM BEACH

Would Like to Make an Oral Statement Tonight: ✓ Yes _____ No

Please Include this Statement/Comment in the Record:

Introduction to verbal, Abbreviated Presentation on 9/12/2002

Gentlemen.... My name is Sten Lilja. I am a beach-front property owner and appreciate the opportunity to comment in this EIS process. It is my concern, that the Corps might not be cognizant of all information and feel it to be my obligation to be here, to help provide some facts. I have already submitted a written presentattion to you, for the record. As it would take too much time to read it all now, I shall skip some parts. Please take time to read the full manuscript, at your convenience.

I find the Draft SEIS to be articulate, but failing to sufficiently address what is needed. I find it "empty", as to what it is supposed to provide support for. Others will comment on purely environmental aspects. I shall therefore limit myself to commenting on just a few aspects, which provide the very foundation, upon which environmental critique is based.

The Draft contains misstatements of fact, omissions and distortion of fact, which obfuscates the purpose of the EIS. I wish to bring the following to your attention, so that it shall not be overlooked in your evaluation:

STEN A. LILJA Abbreviated verbal form Presentation 9/12/2002

The Executive Summary claims: "the FDEP has designated ALL of the Project area, from Marker 116 to 126, as an area of "critical erosion". That statement, IF TRUE, could lead the Corps to presume that the ENTIRE beach has been found to be critically eroded. However, that statement in the Executive Summary is distorted. The Facts Are: The beach in this project, in reality, was declared critically eroded, ONLY down to R-121, a distance of only 4,700 feet out of the total 10,200', down to marker 126. To accomodate the Applicant's request for reconsideration, based on alleged better "Continuity", the DEP (9 months later) relented and agreed "to extend the critically eroded shoreline from 121 through 124 to improve continuity and success of the project. This extension of critical erosion area Is For Continuity and does NOT result in an extension of the area of influence of the inlet." As the DEP letter demonstrates, this is NOT a bona-fide critically eroded beach, NOR did this accomodation constitute eligibility for the one-time unrestricted 50% State funding for the Initial restoration, between markers 121 and 126. While this one-time mitigation, WAIVED regular requirements, for access as well as funding dependency on parking and facilities, for the beach down to marker 121 ONLY, the entire stretch between 121 and 126 will still, also for the present project, remain subject to access and funding regulations. There can be no doubt that 55% of the length of the beach in this project has NOT been truly qualified as critically eroded.

Then there is the cavalier and deceptive computation and application of the Overfill Factor for inferior sand quality. In this case, the calculated amount of required overfill, if PROPERLY done, would be truly ENORMOUS and would cause catastrophic damage to existing environmental assets. I have previously submitted to the Corps, a detailed report entitled FACTS ARE NOT PRESENTED AS FACTS ARE, which analyses errors and technical consequences from application of huge overfill quantities of inferior fill. I include that report here. It is essential that the concerns I raised in my report be addressed in this EIS process. My report was based in part, on a detailed analysis and report by two specialists at the Palm Beach County DERM, as it pertained to Overfill Factor values, which should be applied to the two different sand sources. I shall only quote here from my report's Summary and Conclusion: "There are not sufficient, nor quality fill sources to satisfy even Initial Restoration, and no fill for subsequent mandated Renourishment nor for unforeseen needs. The project is not technically feasible as presented and would cause disasterous damage to the environment." "the facts are that OF is 1.75 for 1/4 of the project and OF for the remaining 3/4, is now 4.0"

As to the Applicant's brief reference to the Overfill Factor, in just 4 lines on page 74 of the Draft, I comment: The Draft's handling of that subject is so convoluted and illogical, as to make it impossible to respond factually, so I shall tryinstead to apply common sense; Based on Assumption upon Assumption, the Draft arrives at what must be understood as some "AVERAGE" Overfill Factor of 1.9. That conclusion emanates from pages 7 and 8 of the consultant's Preliminary Design. When we examine also the table on page 73 of the Draft, along with that page 7, we find that the Applicant has managed to reduce in his the true .43 m/m grain size for native beach sand, down to .34 m/m which of coure would highly affect and distort any computation of the Overfill Factor. It is vitally important, that this project NOT be built on loose sand. While calculation of the Overfill Factor is not an exact science, it is the simplest and most important tool we have. Let us not make a mockery of it. What is also spectacular, is the apparant belief that an AVERAGE Overfill Factor can be arrived at and used for two very different grain size lots of 1.75 and 4.0 Try to imagine what would happen when the dredger runs out of the 1.75 less inferior sand and must switch to 4.0 variety, as he moves down (or up) the beach and, abrubtly, must apply about 2.3 times MORE sand per linear foot of beach, which of course would result in a drastic change in the shoreline. Could you envision a new "plateau" reaching further out into the Ocean? That would be BEFORE Mother Nature washes it away and also ruins those environmental assets, which have not yet been buried during the initial pumping. This comes close to mind-boggling.

Assump-tions

One more observation: In the table on page 73 of the Draft, there is a footnote (which applies to the burrow site ONLY) which reads "gravel, course gravel & cobble were excluded in the Borrow Area samples for grain size analysis." This will distort comparison with other grain size values.

Continued on page 5 of the full printed presentation:

I would like to raise the question here, why this is not a programatic EIS ? I was told about a year ago, that a full programatic EIS would be launched. I believe it is essential, that cumulative impacts be considered and organized. I believe that like projects, Inlet to Inlet, should be considered together and not pulled out separately, like the small piece that is being considered here today, as well as those in the future.

Permit me to suggest, that amongst the Corps' three standard alternatives, the No Action alternative is the key and is justified.

Based on what I have tried to explain, I again urge the Corps to reject entirely the part of the project that lies between R-121 and R-126. Don't allow unjustified harm to the environment. If it ain't broke, leave well enough alone.

Thank you for your attention.

Attachements:
Report dated 2/19/2001
DEP letter, dated 6/13/2000
Pages 7 and 8 of Recommended Preliminary Design, dated 1/27/2000
Town of Palm Beach letter, dated 9/9/1999

STEN A. LILJA

1330 N. Ocean Blvd.
Palm Beach, Fla. 33480

PRESENTATION AT US Army Corps of Engineers' Public DSEIS Hearing, on 9/12/2002 re. Phipps Ocean Park, in Town of Palm Beach.

I appreciate this opportunity to comment on this EIS process. I shall submit a verbatim copy of this presentation, for the record. It is my concern here, that the Corps might not be cognizant of all information and I feel it to be my obligation to be here, to help provide some facts.

I find the Draft SEIS to be articulate, but failing to sufficiently address what is needed. I find it "empty", as to what it is supposed to provide support for. Others will comment on purely environmental aspects. Therefore, I shall limit myself to commenting on just a few aspects, which provide the very foundation, upon which environmental critique is based.

This EIS contains misstatements of facts, omissions and distortion of facts, which obfuscate the purpose of the EIS. I wish therefore, to bring the following to your attention, so that they shall not be overlooked in your evaluation:

On the first page (iii) of the Executive Summary, the Applicant claims:

"The FDEP has designated all of the Project area, from R-116 to R-126, as an area of "critical erosion". This designation is based on (a) the erosion attributable to the influence of the Lake Worth Inlet and ...."

That statement, IF TRUE, could lead the Corps to conclude that the ENTIRE beach has been found to be critically eroded, thereby inducing the Corps to evaluate the DEP permit on that basis. However, those statements in the Executive Summary of the DSEIS are distorted and/or deceptive. It is important that the Corps be informed about the true facts, AS THE FACTS ARE.

In reality, the beach in this project was declared critically eroded, ONLY down to R-121, a distance of just some 4,700 feet, out the total some 10,200' beach length, down to R-126. To accomodate the Applicant's request for alleged improvement of the project, based on claim of better "Continuity" of the project, the DEP eventually (9 months later) relented and agreed

"to extend the critically eroded shoreline from R-121 through R-124 to

improve continuity and success of the project. This extension of critical erosion area is for continuity and does not result in an extension of the area of influence of the inlet."

Importantly, as the DEP letter demonstrates AS WELL, this is NOT a bona-fide critically eroded beach, NOR did this accomodation constitute eligibility for the one-time, unrestricted State 50% funding for the initial restoration, which was called and designated as mitigation for critically eroded beaches, due to the Inlet. The portion of the project between R-121 and R-124 was subsequently added to that accomodation and the remaining portion between R-124 and R-126 was later included, as well, under the "continuity benefit" concept. While this one-time accomodation WAIVED regular requirement for access, as well as funding dependency on parking and facilities, for beaches down to R-121, the entire stretch between R-121 and R-126 will still, also for the present project, remain subject to access and funding regulations. There can be no doubt, that approx. 55% of the length of the beach in this project has NOT been truly qualified as critically eroded and, therefore, the Corps should be so informed. It is quite revealing, that the Town in its 9/9/1999 request for reconsideration, bases that request on "ineligibility for State funding" RATHER THAN on continuity benefit. If I may say so it raises questions about lobbying.

A different slant on and confirmation of these revelations is found in formally adopted Town funding Resolutions for this project, which show the corresponding lack of State funding; Rather than the widely presumed 50% level of State funding for all of this event, those Resolutions allow here only 22%, which computes with the 55% to 45% ratio of non-critically eroded length of beach. I might add, that the large discrepancy with what is generally presumed to be at the alleged 50% funding level, ought to be revealed to the taxpayers.

Based on what was revealed here, I urge the Corps to NOT approve any restoration between R-121 and R-126, thereby sparing the delicate environmental resources from certain harm, that would come from the effects of un-needed restoration.

-------- X --------

Then there is the cavalier and deceptive application and computation of the Overfill Factor concept, which is applied when estimating how much EXTRA and total fill will be needed, due to inferior sand quality, in order to accomplish the intended beach design profile. In this case, the calculated amount of required overfill, if properly done, would be truly ENORMOUS and would cause catastrophic damage to existing environmental assets.

I have previously submitted to the Corps (and other agencies) a detailed report, entitled "FACTS ARE NOT PRESENTED AS FACTS ARE", which analyses errors and technical consequences from application of huge overfill quantities of inferior fill. I was told at the time, that the Corps would hire outside expertise to evaluate my report. I include my report today, with the written copy of my presentation here. My report is dated 2/19/2001. It is essential that the concerns I have raised in that report, be addressed in this EIS process.

My report was based, in part on a detailed report by two specialist at the Palm Beach County DERM, which rather confirmed my own conclusions, as it pertained to values of Overfill factors, which should be applied to the two different sand sources. I trust that the Corps will re-visit my report and include it with other concerns about this project. I shall take your time here, only to quote from the report's Summary and Conclusion:

"There are not sufficient, nor quality fill sources to satisfy even Initial Restoration, and no fill for subsequent mandated Renourishment, nor for any unforeseen needs. The project is not technically feasible as presented and would cause disasterous damage to the environment."

"the facts are, that OF now is 1.75 for 1/4 of the project and OF for the remaining 3/4 is now 4,0 while the project comes up 40% short of the 800,000 cyds "discounted" design profile volume. This tells us, that the project is non-doable, cannot be predicted, is senseless and irresponsible and would not produce any envisioned profile, but would do enormous and un-predictable amount of damage to the environment."

-------- X --------

As to the Applicant's brief reference to the Overfill Factor, in just 4 lines on page 74 of the DSEIS, I shall make the following observations: Frankly, the Applicant's handling of the subject, is so convoluted, distorted and illogical, as to be impossible to respond to factually, so I shall try instead to apply common sense; By some mysterious computation and through some "back-door" entrance, based on Assumption upon Assumption, the Applicant arrives at what must be understood as some average Overfill Factor of 1.9, as the result of its electing to deposit (only) 1.5 mcyds, which the Applicant, without further calculation or analysis, says would yield 800,000 cyds of "design fill". That conclusion and those volumes emanate from pages 7 and 8 of Coastal Tech's 1/27/00 "Recommended Preliminary Design" (which I include with this presentation). Please read those pages, as they appear rather spectacular in its reasoning and approach. When we examine also the table on page 73 of the DSEIS, as well as that page 7, we find that the Applicant has managed to reduce true .43 m/m mean grain size for the native beach sand, via .395 and down to .34 m/m, which of course would highly affect and distort any computation of an Overfill Factor. It is vitally important that this project NOT "be built on loose sand" so to speak. While calculation of the Overfill Factor is not an exact science, it is the simplest and most important tool available. Let us not make a mockery of it.

What is also spectacular, is the apparant belief that an AVERAGE Overfill Factor can be arrived at and used for two very different mean grain size lots of fill (1.75 and 4.0 resp). Just like socks, one size fits all? Please try to imagine what would happen, when the dredger runs out of the 1.75 OF sand and must switch to the 4.0 variety, as he moves down (or up) the length of the beach and, abruptly, must apply about 2.3 times MORE sand, per linear foot of beach, which of course would result in drastic change in the shoreline. Could you envision a new "plateau" reaching further out in the Ocean? That would be BEFORE Mother Nature washes it away and ruins those environmental assets, which have not yet been buried, during the initial pumping. This must come close to definition of mind-boggling.

One more observation: In the table on page 73 of the DSEIS, there is a foot note (which applies to the proposed burrow sites only) which reads "gravel, course gravel & cobble were excluded in Borrow Area samples for grain size

analysis". This will distort comparison with other grain size values.

I would like to raise the question here, why this is not a programatic EIS ? I was told about a year ago, that a full programatic EIS would be launched. I believe it is essential, that cumulative impacts be considered and organized. I believe that like projects, Inlet to Inlet, should be considered together and not pulled out separately, like the small piece that is being considered here today, as well as those in the future.

Permit me to suggest, that amongst the Corps' three standard alternatives, the No Action alternative is the key and is justified.

Based on what I have tried to explain, I again urge the Corps to reject entirely the part of the project that lies between R-121 and R-126. Don't allow unjustified harm to the environment. If it ain't broke, leave well enough alone.

Thank you for your attention.

Attachements:
Report dated 2/19/2001
DEP letter, dated 6/13/2000
Pages 7 and 8 of Recommended Preliminary Design, dated 1/27/2000
Town of Palm Beach letter, dated 9/9/1999

Department of
Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

June 13, 2000

Al Dusey, P.E.
Director, Public Works
Town of Palm Beach
Post Office Box 2029
Palm Beach, Florida 33480

Dear Mr. Dusey:

Last October, the Department agreed with the Town of Palm Beach to participate in a one-time restoration of beaches downdrift of Lake Worth Inlet to serve as mitigation for inlet impacts. Areas impacted by the inlet were determined to extend from R76-R121, and initial restoration projects within this area would be eligible for 50% state cost sharing. Our staff met with Coastal Technology Corporation on March 22, 2000 to discuss the Phipps Ocean Park Nourishment Project and possible extension of the eligible project area to R126.

Coastal Technology proposed that the Phipps Ocean Park project extend from R116-R126 based on modeling results that demonstrate sand will rapidly shift from R116 to R121 down to a natural headland located at approximately R124-R125. Therefore, the project will benefit with sand placement from R116 through R124. The Department revisited the critically eroded shoreline designation, and based on the information provided, agrees to extend the critically eroded shoreline from R121 through R124 to improve continuity and success of the project. This extension of the critical erosion area is for project continuity and does not result in an extension of the area of influence of the inlet.

If you need any further information, please contact Ms. Jackie Thompson at 850/487-1262, extension 195 or at the letterhead address above, Mail Station 300.

Sincerely,

Alfred B. Devereaux, Jr., Director
Office of Beaches and Coastal Systems

ABD/jt/p

$9.06 million / 1.5 million cu yds = $6.00/yd

With the unit cost of sand estimated for the initial project at $4.50, and assuming 3% allowance for inflation per year, this groin benefit translates into a cost avoidance of approximately $57,000 in year eight. Similar calculations could be made for future 8-year renourishment cycles, but clearly it would take in excess of a typical 50-year project life cycle to recover the $1M+ cost of the groins, which suggests that their use is not cost effective.

A comprehensive evaluation of "T-head" groins was beyond the scope of this report. However, from the negligible benefits predicted by the model results for the simplified, more conventional "straight" groin case, any "T-head" groins would likely have to be extremely long and large to affect the processes sufficiently to hold any substantial amount of beach material.

Borrow Material Effects: The shoreline change modeling described above evaluated a project having a nominal design fill volume of 1 million cubic yards as proposed in the Conceptual Design. The next stage in the design process was to adjust the fill volume to treat the differences in performance which might result from differences in grain size between the borrow and native sand.

The existing native material composite grain size has been measured at 0.395mm. However, comparisons with the sand grain size on adjacent beaches suggest that this area may be better represented by a grain size of 0.34 mm. The Corps of Engineers conducted a preliminary investigation of native sand along Palm Beach County beaches in 1961. The results of this investigation provide a historical representation of the sand characteristics of the beaches within the area which included this project. According to the results, South Palm Beach County has a mean grain size of 0.34 mm and is moderately sorted. This section of Phipps beach might be characterized as "stressed", having the highest erosion rate of all the Town beaches. It has been observed that beaches in this condition can lose to erosion over time a larger volume of the finer-grained portion of their gradation, and as a result retain only the larger grain size material. For the purposes of this design a grain size of 0.34 mm was used to describe the native sand size. THAT'S WHY design should be .395!

Based on the borrow area geotechnical data provided by CP&E, the proposed borrow area contains sand with smaller composite mean grain sizes (0.22 mm and 0.32 mm) as compared to the native beach (0.34 mm). An "overfill factor," expressed as a ratio, establishes some additional volume of finer-grained borrow material which would be necessary to produce a specific design volume of native beach material. The *Concept Plan* construction volume was

based on an overfill ratio of between 1.0 and 1.2, which essentially assumed the borrow material would be the same size as the native. The actual overfill ratios calculated for the sands in the two sites identified by CP&E is about 1.2 for the 0.32 mm material, and about 3.4 for the 0.22 mm material.

The application of these overfill factors to the design fill of 1 million cubic yards would result in a required total project quantity of about 2.1 million cubic yards. If the total project volume is limited to 1.5 million cubic yards in order to generally stay within the project budget established under the assumptions contained in the Conceptual Design, the result would be to effectively place *less* than the design fill of 1 million cubic yards. After proportioning the calculation for the two different borrow sizes, and assuming all of the 0.32 mm material will be used, the net effect of limiting the cost would be equivalent to placing a design fill of roughly 800,000 cubic yards of native sand. From our modeling experience the practical result would be that slightly more of the northern shoreline of the area would erode back to the existing condition within the 8-year renourishment period. The general geometry of the rest of the shoreline and the *average* performance of the fill would not be dramatically affected by the difference in assumed design volume.

If additional funding can be made available, Coastal Tech supports the placement of additional sand volume up to the calculated 2.1 million cubic yard requirement. However, if the present budget target is preserved, the difference in overall average project performance at the 8-year maintenance point would *not* be sufficiently great that we would recommend against proceeding with the project because of concerns over excessive losses.

The attached permit sketches illustrate the proposed borrow area cuts for initial construction.

Cross-Shore Profile Adjustment: After the fill is initially placed, the beach will rapidly adjust to come into equilibrium with the ambient bottom conditions, wave climate and composite grain size. For purpose of estimating this adjustment and its effect, the SBEACH model was applied to the anticipated construction fill under the influence of a 15-year return interval storm event. Figure 10 illustrates the projected initial adjustment which is estimated to be a landward migration of the shoreline of about 90 feet at MHW. This adjustment incorporates the effects of moving from an excessively steep initial construction profile to a more "natural" slope, *plus* some of the effect of the fill grain size on establishing that final slope angle. In one sense this might not be viewed as net volumetric erosion, because the original volume will remain in the (submerged) nearshore area. However, because of the

9/16/99 - RJD
Re: Phipps Ocean Park Restoration Project

xc: Mayor and Town Council
Former Shore Protection Board Members
Dusey
Skittone
Pollitt
To: Suspense 9/22/99

TOWN OF PALM BEACH

Public Works Department

RECEIVED
SEP 10 1999
TOWN OF PALM BEACH
MANAGER'S OFFICE

RECEIVED
SEP 16 1999
TOWN CLERK'S OFFICE
TOWN OF
PALM BEACH

September 9, 1999

Dr. Alfred Devereaux, Chief
Office of Beaches and Coastal Systems
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3200

Dear Dr. Devereaux:

We have recently learned that the southern end of the Town's proposed beach restoration project at Phipps Ocean Park was determined to be ineligible for State funding because it is not considered to be critically eroded. We respectfully request a reconsideration of this decision.

Please let us know how to proceed through your appeal process. If you wish to discuss, please call at (561) 838-5440.

Very truly yours,

Albert P. Dusey

Albert P. Dusey, P.E.
Director of Public Works

APD:ms

c: Robert J. Doney, Town Manager
Dave Decker, P.E., Applied Technology & Management
James M. Bowser, P.E., Town Engineer & PW File

MAILING ADDRESS Post Office Box 2029 • 360 South County Road • Palm Beach, Florida 33480 • (561) 838-5440
[illegible] • West Palm Beach, Florida 33401 • Fax (561) 835-4691

Sten A. Lilja

1330 No. Ocean Blvd.
Palm Beach, FL 33480
(561) 844-0612

State of Florida, Dept. of Environmental Protection
Office of the General Counsel
Attention: M.B. Adelson, IV, Senior Assistant General Counsel
3900 Commonwealth Boulevard Mail Station 35
Tallahassee, FL 32399-3000

By Certified Mail, Return Receipt Requested

RE: **NOTICE OF INTENT TO ISSUE, file # 0165332-JC, Palm Beach County, Town of Palm Beach, Phipps Ocean Park Restoration Project.**

Dear Sir:

The attached report, dated February 19, 2001, pertaining to the Phipps Ocean Park Project, is submitted herewith as an addition to my January 4, 2001 Petition for a 90 day extension of time and Supplemental Environmental Impact Study, with the hope that you will find it helpful in your handling of this matter. The intent of my report is to provide analyses and facts, which can assist your experts in the field, to determine the magnitude and potential for environmental damage. Misinterpretation of facts could cause irreversible and permanent harm to the environment. I trust that this report will assist you in deciding that a F.S. Section 120.569 and 120.57 Administrative Hearing must take place. Thank you.

Sincerely

Sten A. Lilja

NOTE: To the recipients of a copy of this letter and the attached report:

Ladies and Gentlemen:

You have shown interest in this serious matter and have made the effort to voice and convey your opinion and concerns. I hope you will find this mailing interesting.

Copies to:

FDEP/OBCS	Dr. Devereaux, Brantley, Seeling, Mille, Murphy
USACOE	Col. May, Hall, Ferrel, McKoy, Griffin
DERM	Walesky, Barry, Bates, Clinger
USFWS	Slack, Simon, Hamilton, Webb
NMFS	Johnson
FWC	Maher
FFWCC	Trindell
USEPA	Hankinson, Fasselt, Kruczinsky, Harvey, Meiburg, Tripp, Murphy, Lindeman
NMFS	Mager
NOAA	Hogarth, Ballew
The Audubon Society of the Everglades	
The ReefKeepers International	
Florida Division of Historical Resources	Snyder Matthews
Town of Palm Beach	

Sten A. Lilja

1330 No. Ocean Blvd.
Palm Beach, FL 33480
(561) 848-0148

February 19, 2001

Subject: **Florida DEP File No. 0165332-001-JC, Palm Beach County**
Town of Palm Beach
Phipps Ocean Park Restoration Project

USACOE, Town of Palm Beach, Phipps Ocean Park
PN 200000380 (IP-DSG)

PHIPPS OCEAN PARK RESTORATION PROJECT;

"FACTS ARE NOT PRESENTED AS FACTS ARE"

INTRODUCTION: It is the purpose of this report to demonstrate the potential damage to the environment that may be inflicted by the quantity and quality of fill proposed for the project. Calculation of fill amounts is needed to demonstrate how large areas of environmental resources will be buried by the fill. The fill quantities may be secondary, but are nevertheless quite interesting. Quantities depend on qualities, so discussion of borrow area proposals are important.

The environmental consequences from the proposed Phipps Restoration Project are far more severe than has been revealed in the Permit Application and supporting documents. There has been major misinformation and disinformation, which have combined to present a false picture. The true extent of the project has not been revealed and the true consequences are, that the destruction of habitats and environmental resources would be much more extensive than envisioned to date. These are the facts:

1. The proposed restoration initially called for a basic profile design volume of 1.0 million cubic yards ("mcyds"). Because the proposed sand sources will provide a fill material which is different from the native beach sand, and does not have the staying capacity of the native beach-sand, there is applied an Overfill Factor ("OF") to determine the extra amount of fill required. Natural forces will sort the fill, leaving only sand of the grain sizes found on the native beach, while washing away those components of the fill, which will not stay on the beach and become part of the profile.

2. Based on OF ratios for the borrow areas, Coastal Tech ("CT") calculated (page #8 of Recommended Preliminary Design) that 2.1 mcyds of fill would be required to provide the intended basic profile. CT concluded, however, that the full 2.1 mcyds of fill may be difficult to extract and the cost would exceed the proposed budget. Therefore, CT "discounted" the project to 1.5 mcyds to stay within budget, but the project would then fall short of the initially intended 1.0 mcyds basic design profile. The 1.5 mcyds of fill would correspond to an 800,000 cubic yard

("cyds") "discounted" basic profile design. 1.5 mcyds of available type fill would provide a berm width of 110-330 feet, with a dry beach width of 180-400' which would, after initial (1 ½ year?) adjustment, shrink by about 90', at MHW (pages #1 and #8 of Recommended Preliminary Design). Those 1.5 mcyds of fill would be collected by first using up all of Area III (because of better material) and the balance to come from Area IV.

3. CT recognized that the cut-back to 1.5 mcyds (from the calculated 2.1 mcyds) would have the consequence that Renourishment (as different from Restoration) would be required in a shorter time than 6-8 years, which is otherwise typical for projects of this kind. It is the harmful effect, which just the INITIAL 1.5 mcyds of fill would have on the environment, that is the basis for the unprecedented amount of objections to this project, by the public, by private organizations and by Government agencies.

4. OFs are derived mainly from grain size and uniformity (sorting) as those characteristics are compared with properties of the native beach sand. The OFs which CT used for the two borrow areas are too low, because the description of the native sand was defective. It may be tempting to choose and use values, which would result in a low OF which, in turn, would translate into less fill and a less costly project (before it is built). Such under-estimation will ultimately result in unplanned harm to the environment and to the pocket book.

5. As stated above, the Application calls for 1.5 mcyds to be taken, first from (the better) Area III and then from Area IV. At the time of the Application, those borrow areas were said to contain 1,004,000 and 2,397,000 cyds, respectively, with presumed OFs of 1.2 and 3.4 The areas were subsequently modified to provide buffer for reef and a pipe.

6. By August of 2000, the applicant had reduced those presumed available gross quantities in borrow Areas III and IV, to 474,966 cyds and 1,990,129 cyds respectively. Without going into detail, it is clear that even with CT's (under-estimated) OF values, there would be insufficient borrow amounts available to satisfy the 1.0 mcyds basic design, now or later. There would be a shortfall of gross fill. Because of difficulties to collect all fill from a borrow site, a margin of 25% is usually reserved, which would then add substantially to that shortfall. Consequently, the Phipps project, as applied for, was no longer feasible, as based on Areas III and IV. That fact, however, if understood by the applicant, has not been conveyed to the public, as of 1/31/01.

7. To make matters worse and the project even less feasible, technically and practically, it was revealed to the public on 7/20/00, that the large percentage of gravel, rock and cobble in both borrow areas could not legally be put on the beach and that the applicant had petitioned the State for Waiver and Variance from the law. The Summary of CT's "Supplementary Geophysical Analysis" of 9/25/00 suggests that each borrow area has "several percent of gravel and cobble content". If the law is upheld and not by-passed by means of political interference, the aforementioned shortfall is exacerbated and the Phipps project, as applied for, is even further from being feasible. The recourse would be to cut back on the project, abandon it, or find some

different source of supply. It should be noted that Coastal Planning & Engineering (CP&E) in its "Offshore Sand Source Investigation", page #47, has recommended that both borrow areas be refined, to improve quality of fill. The core analyses, including the summary tables in the "Supplementary Geophysical Analysis", dated 9/25/00, do not indicate provisions for such refining. The Petition for Waiver and Variance States: "Consulting engineers for the project estimate that even if sorting the material prior to placement were technically feasible, it could ***double*** the cost of the project..." (emphasis added) Cost of screening would be prohibitive.

8. Keep in mind that availability of fill is **NOT THE OBJECT** of this report: It is rather the **DAMAGE** to the environment, that would be caused by the type and amount of fill which would eventually be used for the project. Before going further into the next phase of this report, permit a layman to try to interpret the consequences of the information, up to this point. All information in the foregoing was obtained and derived from CT facts in the Permit Application;

A. Area III will provide 75% of 474,966 cyds = 356,225 cyds net
Area IV can yield total 75% of 1,990,129 cyds = 1,492,597 cyds net
To be taken from Area IV: 1,500,000 - 356,225 = 1,143,775 cyds net

Amount left over in Area IV after 1,500,000 cyds project 348,822 cyds net

B. "Native beach equivalent" volumes for 1,500,000 cyds fill mixture:
From Area III; 356,225 / 1.2 = 296,854 cyds
From Area IV; 1,143,775 / 3.4 = 336,404 cyds

Total 633,258 cyds,

which is well short of the 800,000 cyds "discounted" design profile. **The project is not feasible as presented. 1,500,000 - 633,258 = 866,742 = 58% is amount that will be lost.**

C. If it were elected also to use up the balance from Area IV, the "native beach equivalent." total amount available would be 735,853 cyds, which is still short of the 800,000 cyds "discounted" design volume. It would also mean to "dump" the 1,112,969 cyds balance from the borrow areas, to cause added harm to environmental resources.

D. These "predicaments", which ought to have been known/understood by the applicant, had not been conveyed to the public, as of 1/31/00. It is too late to find out about miscalculations, once the project has been started!

E. Possible solutions are: Reduction of scope, or abandonment. Finding an alternate source of fill would depend on calculation of the cost/benefit ratio of the beach. Public funds should not be wasted on a defective project; one which also would cause great harm to the environment. Funds, State and local, can be put to better use.

F. A further complication and threat to the environment comes from the, as yet not specified in detail, State requirement that Renourishment must take place before the new beach erodes back to where some 40% of the volume has been lost, usually within 6-8 years. Because of the aforementioned major sand quality problems, Renourishment will likely be required in about half the time. Renourishment will cause additional and cumulative harm, at least in parts of the project, or elsewhere. There has been no mention or discussion regarding any ADDITIONAL area that would be covered over and damaged by subsequent fill.

G. The environmental concerns and discussions have concentrated on the LOCATION of the Equilibrated Toe of Fill, as resulting from the Application's 1.5 mcyds of fill which, shall be shown below, was based on erroneous values for fill characteristics. When values, which were determined by Palm Beach County DERM are applied, the estimated location of the Toe of Fill line will be different and, depending on the location of hard bottoms, likely more harmful to the environment. It is left to the experts to determine the extent and location of additional harm that will occur when revised fill amounts in the report are applied. Keep in mind as well, that those subsequent mandated Renourishment(s) (expected after 5-6 years) may cause yet further environmental damage, than has been envisioned to date. AGAIN, the purpose of this report is just to provide corrected computations of the amounts of fill which were, erroneously, presented in the Project Application.

9. As if what has been described so far in this report were not enough, here is part of "The Rest of the Story.": As indicated in Items #4 and #5 above, the calculations of OFs, which were used by CT, were based on defective data. Specialists at Palm Beach County DERM have calculated OF values, which are also supported by their experience and prior work with the Phipps area. Those values are displayed in the attached report, dated 2-14-01. When DERM's OF values are applied to fills from Areas III and IV, or to similar borrow areas, the implications from the environmental point of view, become disastrous. Please compare Item #8, B and C, above.

10. Using DERM's OF values, the net amounts of fill from Areas III and IV, expressed as "native beach equivalent volume" for the 1.5 mcyds fill mixture, can be calculated as follows:

From Area III: 356,225 cyds @ OF = 1.75 would provide	203,557 cyds net
From Area IV: 1,143,775 cyds @ OF = 4.0 would provide	285,943 cyds net
Total	489,501 cyds net

which is, of course, far short of the calculated "discounted" 800,000 cyds design profile volume, and even further from the initially intended 1.0 mcyds basic profile volume.

11. Total maximum available "native beach equivalent volume" from both Areas III and IV would be:

From Area III	203,557 cyds net
From Area IV	373,149 cyds net
Total	576,706 cyds net

which still falls significantly short of both intended basic profile volumes.

12. IMPLICATIONS: While pondering the information in Items 10 and 11, let us NOT FORGET that damage to the environment, as it has been visualized to date, is based on 1.5 mcyds of fill. 633,258 cyds of which (per Item #8B above) might stay on the beach, while the balance of 866,742 cyds would wash away to where it contributes little, if anything, to storm protection. FURTHERMORE, if using DERM's OF values of 1.75 and 4.0, we find that only 489,501 cyds out of the 1,500,000 cyds INITIAL placement might stay, while 1,010,499 cyds would wash away and harm the environment even more, than when using CT's OF values. Remember that Area III has "the least inferior" grain size of ALL listed sources in the Sand Search Report.

13. What does it all add up to and how does it relate to what is being argued today regarding damage to the environment? The Project Application has saddled us with the arbitrary 1.5 mcyds of fill and the damage that the largest part thereof will do, when it escapes from its initial placement. Where will the Equilibrium Toe of Fill end up, and how much hard bottom and habitats will be effected in the process? Please remember that 1.5 mcyds is the already "discounted" compromise form of CT's (already erroneous) estimate of 2.1 mcyds for the Initial Restoration. Common sense tells us that the lower fill amount of 1.5 mcyds would be just the beginning of further damage to the environment. Using up all of the claimed 2,465,085 cyds, less 25% yield factor = 1,848,813 cyds total in Areas III plus IV, cobble, gravel and all, would extend the Toe of Fill farther out than discussed publicly to date, while still providing only a basic profile volume of some 500,000 (489,501) cyds. Any further additions of fill, be it of inferior or of better quality, will just move the Toe of Fill farther out and likely cause additional damage to habitats. Why has not that predictable consequence been visited?

14. What is then the SOLUTION? Common sense tells us to either scrap the project or to minimize the project by putting minimal amounts of sand on the basic public beach. There is no real need to fill anywhere else. If there are still demands for sand on private property (to create recreational beaches), the benefitted owners themselves should go through the permitting process, find sand and pay for it all. There is no basis in the law or precedents to make other residents pay for such amenities, from which they cannot benefit. In the few places where additional measures for storm protection may be required, it is still the property owner's burden to arrange for remedy of a problem which exists because of the property planner's previous neglect. Installing sea walls or adding height to existing sea walls would be more effective storm protection, if that were the true reason for demanding sand today. The notion that the beaches are eroding, is contrary to scientific claims being made today by different sources.

15. It is accepted by professionals, that the portions of new fill which natural forces remove to create as stable a beach as possible, will to a large extent be transferred to submerged areas, where it will provide limited calming effect on storm waves. The fines will be washed out to sea and disappear, while a smaller quantity will get into the lateral transport to other areas. Most of the fill will settle near shore, often on top of habitats and hard bottoms.

16. What has been discussed here, up to now, are the effects and implications of the INITIAL Restoration. While DEP funding conditions call for mandatory maintenance nourishment for at least 10 years and while in the Application and related documents is mention of Renourishment (with perhaps 30 - 40% as much fill again) in less than 8 years (perhaps 5-6 years), there is no plan or discussion, where fill could be found for such mandatory Renourishment. The "Sand Search Report" does not offer any solution. Remarkably, there is no discussion ANYWHERE regarding the additional damage to the environment, which would follow, in a cumulative manner, from subsequent maintenance or Renourishment.

17. There may be a few individuals who were aware of, or have understood, what has been revealed in this report, although at least the Town officials must be aware that they have, formally, executed Town of Palm Beach "Resolution 14-00", on 4/11/00, which authorizes the SECOND HALF of the so called 10-year Plan, which would place some 50-80% additional amounts of fill in Reach #7, over and above what is commonly understood to be the extent of the 10-Year Plan. What has been described in this report are only the effects of the first (INITIAL) half of the Town's 10-year Plan (which includes Phipps), where the second half has, somehow, remained secret. It is time to let the reader form his/her own conclusions from what has been presented here. It is hoped that the presented information, which is based entirely on official facts and data, will provide a quantitative basis, upon which environmental experts can analyze and predict the amount of damage that will emanate from the proposed project, as well as from future acts, which have not been revealed by the Applicant.

18. Finally, is this and other similar proposed projects in the Town of Palm Beach necessary, or is the situation brought on by scare tactics and politics? More and more information and statements are turning up, which all point to the same conclusion, i.e., that the beaches in the Town (as elsewhere) have remained basically stable, for the past some 60 years, with only temporary variations. So, what is then the need to restore? By leaving well enough alone, the environment would not be unnecessarily damaged by unneeded activity. The less the better.

SUMMARY: The project cannot be built as presented in the Application, because of erroneous values for, (a) fill properties and, (b) available volumes. As a consequence, more fill would escape and cause damage to larger areas of environmental resources and habitats, than has been foreseen in the project Application. Trying to add more fill would still not accomplish even the "discounted" design profile, but would cover even more areas and do further harm. There are not sufficient, nor quality fill sources to satisfy even the Initial Restoration, and no fill for subsequent mandated Renourishment, nor for any unforseen needs. The Project is not technically feasible as presented and would cause disastrous damage to the environment.

CONCLUSION: This project, as conceived and described in the 1/31/2000 Permit Application (and still the same as of 12/31/2000) is based on proposed fill with OF = 1.2 for 2/3 of the 1.5 mcyds project. The facts are, that OF now is **1.75 for 1/4** of the project, and OF for the remaining **3/4 is now 4.0,** while the project comes up **40% short** of the 800,000 cyds "discounted" design profile volume.

This tells us that, the project is non-doable, cannot be predicted, is senseless and irresponsible, would not produce any envisioned profile, but would do enormous and un-predictable amount of damage to the environment. How can this project have progressed to the level of "Notice of Intent to Issue"? Who has let this occur?

based on an overfill ratio of between 1.0 and 1.2, which essentially assumed the borrow material would be the same size as the native. The actual overfill ratios calculated for the sands in the two sites identified by CP&E is about 1.2 for the 0.32 mm material, and about 3.4 for the 0.22 mm material.

The application of these overfill factors to the design fill of 1 million cubic yards would result in a required total project quantity of about 2.1 million cubic yards. If the total project volume is limited to 1.5 million cubic yards in order to generally stay within the project budget established under the assumptions contained in the Conceptual Design, the result would be to effectively place *less* than the design fill of 1 million cubic yards. After proportioning the calculation for the two different borrow sizes, and assuming all of the 0.32 mm material will be used, the net effect of limiting the cost would be equivalent to placing a design fill of roughly 800,000 cubic yards of native sand. From our modeling experience the practical result would be that slightly more of the northern shoreline of the area would erode back to the existing condition within the 8-year renourishment period. The general geometry of the rest of the shoreline and the *average* performance of the fill would not be dramatically affected by the difference in assumed design volume.

If additional funding can be made available, Coastal Tech supports the placement of additional sand volume up to the calculated 2.1 million cubic yard requirement. However, if the present budget target is preserved, the difference in overall average project performance at the 8-year maintenance point would not be sufficiently great that we would recommend against proceeding with the project because of concerns over excessive losses.

The attached permit sketches illustrate the proposed borrow area cuts for initial construction.

Cross-Shore Profile Adjustment: After the fill is initially placed, the beach will rapidly adjust to come into equilibrium with the ambient bottom conditions, wave-climate and composite grain size. For purpose of estimating this adjustment and its effect, the SBEACH model was applied to the anticipated construction fill under the influence of a 15-year return interval storm event. Figure 10 illustrates the projected initial adjustment which is estimated to be a landward migration of the shoreline of about 90 feet at MHW. This adjustment incorporates the effects of moving from an excessively steep initial construction profile to a more "natural" slope, *plus* some of the effect of the fill grain size on establishing that final slope angle. In one sense this might not be viewed as net volumetric erosion, because the original volume will remain in the (submerged) nearshore area. However, because of the

including a bathymetric survey, side scan sonar survey and subbottom seismic profiling over 218 line miles. The last phase of field studies included conducting 50 jet probes, and analyzing sediment gradation in 437 sub-samples taken from 94 vibracores.

The seven (7) identified borrow areas lie offshore in water depths of 20.0 feet to 50.0 feet NGVD. Three (3) borrow areas are new sites located as a result of the most recent investigations. Three previous sites have been reanalyzed and one is an enlargement of an existing borrow area. Table 4 lists the volume of sand and grain size characteristics for each of these areas. The total volume of fill material available in the seven borrow areas is 20,609,000 cubic yards. The mean grain sizes within the borrow areas range from 0.32 mm to 0.19 mm. The silt content is typically low, approximately 2% in all borrow areas.

RECOMMENDATIONS

It is recommended that the identified borrow areas be utilized for beach nourishment/ renourishment activities in the Town of Palm Beach. The borrow areas have been defined to incorporate the maximum sand available for permit purposes. It is recommended that in the final design phase for specific beach restoration projects, the borrow areas be refined to obtain maximum fill quality.

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Chen, C.S., 1965. The regional lithostratigraphic analysis of Paleocene and Eocene rocks of Florida. *Florida Geological Survey, Geological Bulletin* No. 45, 105 pp.

Coastal Planning & Engineering, Inc., 1988. Town of Palm Beach, Florida Beach Nourishment Project Borrow Area Investigation Phase I Offshore Borrow Area. Boca Raton, FL.

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Cooke, C.W., 1945. Geology of Florida. *Florida Geological Survey, Bulletin No.* 29

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Borrow Area Sampling: The following summarizes observations from sample analysis results for borrow area core samples:

1. Volume of coarse fraction is between
   a) 0.1 and 4.8% per gallon per section
   b) 0.2 and 2.8% per gallon per core

2. Gravel-sized material in the borrow areas (Exhibit 3) is distinguished from that obtained from the native beach (Exhibit 1 and 2) by the presence of:
   a) stick coral (modern) and coral fragments (fossil?; Exhibit 4)
   b) encrusted and fragmented shells (fossil?)

3. The highest gravel values were found in the upper-most section of cores 79 and 94.

4. Cores closest to the relict coral reef terrace (79, 94 and 89) contain the highest coarse fraction, suggesting the sediment is deposited in association with storm induced sediment transport. Clast composition and stratigraphic distribution support this supposition.

5. Borrow Area IV contains less gravel than Area III.

6. To optimize probability of encountering sediment with low gravel content, additional exploration should focus on: (1) areas distal to the reef terrace and (2) proximal or within Borrow Area IV.

V. Summary

This *Supplementary Geotechnical Analysis* provides a quantitative characterization and comparison of the coarse gravel and cobble content within proposed borrow areas and the native beach sands along the fill area of the Phipps Ocean Park Beach Restoration Project. The results suggest the two areas are similar; each containing several percent gravel and cobble content. As there are myriad sources of potential error or variance, quantitative estimates of this sort should be viewed with caution until a more rigorous method of analysis can be developed.

An analysis of potential error introduced during the process of field sampling and laboratory analysis suggests the largest source of error occurs during the process of sieving (Table 4). The native beach is sorted and compacted by "surf beat". Our sampling method disturbs grain-to-grain relationships and re-packs the sediment; the coring procedure also alters grain packing. It is unclear what the net effect of all of these variables has had on this project. Inspection of Table 5 suggests an error of 20% of the sample volume could easily be introduced by sediment compaction during the sieving procedure alone. Discriminating between 2% or 3% is therefore somewhat problematic.

TABLE 4
TOWN OF PALM BEACH BORROW AREA SAND DATA

BORROW AREA	Average Depth of Cut (ft.)	Total Volume (c.y.)	Mean Grain Size (mm)	Silt Content (%)	Phi Sorting
North Inlet Borrow Area	10.0	3,500,000	0.25	1.8%	0.82
South Inlet Borrow Area	10.0	3,560,000	0.25	2.1%	0.95
Secondary South Inlet Borrow Area	10.0	1,205,000	0.25	2.4%	0.98
Borrow Area I	20.0	2,953,805	0.19	1.9%	-
Borrow Area II	20.0	5,989,155	0.19	1.9%	-
Borrow Area III	10.7	1,004,000	0.32	2.3%	1.20
Borrow Area IV	15.7	2,397,000	0.22	1.7%	0.90
	TOTAL C.Y.	20,608,960			

Table 5b - Summary of Grain Size and Gravel Content - Borrow Area III

Data from Coastal Planning & Engineering						Data by Coastal Tech			
Core I. D.	Effective Length (ft.)	PHI Mean	Mean (mm)	PHI Sorting	% Silt	Area of Influence (acres)	Total Volume (cy)	Estimated % of Gravel by Volume	Volume of Gravel (cy)
LW93#13 - Composite	15.3	1.46	0.36	1.31	1.90	6.68	164,889	0.0%	0
LW93#15 - Composite	15.8	2.32	0.20	0.64	2.28	0.81	20,572	0.2%	37
LW93#16 - Composite	13.9	2.7	0.15	0.45	1.36	2.97	66,603	0.0%	0
VC99-81 - Composite	12.4	1.9	0.27	1.14	3.92	6.66	133,236	0.4%	533
VC99-84 - Composite	13.2	1.1	0.45	1.48	1.78	4.21	89,656	0.7%	628
Volume Weighted Avg - by Coastal Tech			0.32	1.1	2.4	21.33	474,956	0.3%	1,198

Table 5b - Summary of Grain Size and Gravel Content - Borrow Area IV

Data from Coastal Planning & Engineering						Data by Coastal Tech			
Core I. D.	Effective Length (ft.)	PHI Mean	Mean (mm)	PHI Sorting	% Silt	Area of Influence (acres)	Total Volume (cy)	Estimated % of Gravel by Volume	Volume of Gravel (cy)
LW93#19 - Composite	15.0	2.36	0.19	0.88	1.28	9.73	235,466	0.0%	0
LW93#20 - Composite	13.0	2.25	0.21	0.71	2.58	8.15	170,933	0.1%	181
VC99-88 - Composite	16.8	2.4	0.19	1.03	1.50	15.38	411,783	0.1%	412
VC99-89 - Composite	14.2	1.9	0.27	1.07	1.35	24.47	560,591	0.3%	1,682
VC99-90 - Composite	15.3	2.4	0.19	0.95	1.91	24.77	611,356	0.2%	1,223
Volume Weighted Avg - by Coastal Tech			0.22	0.9	1.7	82.49	1,990,129	0.2%	3,497

Table 5c - Summary of Grain Size and Gravel Content - Project

Borrow Area	Effective Length (ft.)	PHI Mean	Mean (mm)	PHI Sorting	% Silt	Area of Influence (acres)	Total Volume (cy)	Estimated % of Gravel by Volume	Volume of Gravel (cy)
III			0.32	1.1	2.4	21.33	474,956	0.3%	1,198
IV			0.22	0.9	1.7	82.49	1,990,129	0.2%	3,497
Volume Weighted Avg - by Coastal Tech			0.24	1.0	1.8	Totals :	2,465,085	0.2%	4,695

Note:
(1) Gravel is defined as material with dimension greater than or equal to 3/4 inches.
(2) Cores from 1993 were not tested in concert with September 25, 2000 Supplementary Geotechnical Analysis; values are adjusted based on average adjustment for tested 1999 cores.

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February 14, 2001

Dr. Sten Lilja
1330 N. Ocean Blvd.
Palm Beach, FL 33408

SUBJECT: PROPOSED SAND SOURCES FOR PHIPPS PARK BEACH NOURISHMENT PROJECT

As requested in your letter of January 25, we have calculated the following overfill factors using the standard methodology recommended by the U.S. Army Corps of Engineers*, native beach sediment information from our 1993 study of the project area and data from the "Supplementary Geotechnical Analysis" from Coastal Tech dated September 25, 2000. It is our understanding that the Coastal Tech data describes the most recent proposal for dredging Borrow areas II & III and that other native beach sediment data was used in the proposed design.

It should be noted that the overfill factor calculation "should be used only as a general indication of possible beach behavior*" A discussion of borrow material and overfill factors copied from the Shore Protection Manual is attached for your review.

Borrow Area III:
Average depth of cut = 10.7 ft
Mean grain size = $M_{\varphi b}$ = 0.32 mm = 1.64 φ
sorting = $\sigma_{\varphi b}$ = 1.10 φ
$(M_{\varphi b} - M_{\varphi n}) / \sigma_{\varphi n}$ = (1.64-1.25) / 0.57 = 0.68
$\sigma_{\varphi b}/\sigma_{\varphi n}$ = 1.10/0.57 = 1.93
Overfill factor = R_A = 1.75

Borrow Area IV:
Average depth of cut = 15.7 ft
Mean grain size = $M_{\varphi b}$ = 0.22 mm = 2.18 φ
sorting = $\sigma_{\varphi b}$ = 0.90 φ
$(M_{\varphi b} - M_{\varphi n}) / \sigma_{\varphi n}$ = (2.18-1.25) / 0.57 = 1.63
$\sigma_{\varphi b}/\sigma_{\varphi n}$ = 0.90/0.57 = 1.58
Overfill factor = R_A = 4.0

Your letter questioned whether sufficient fill is available in the proposed borrow areas. In the most current design, it is our understanding that Coastal Tech has

calculated the total volume in the two borrow areas as 2,465,085 cubic yards, of which 1.5 million yards is to be dredged to fill the design template. Information regarding anticipated equilibrium profiles, the calculation of renourishment intervals, sand sources for renourishment and cost/benefit ratios of the proposed plan could probably be obtained from the local project sponsor, the Town of Palm Beach.

Should you have any further questions please contact Daniel Bates at (561) 233-2434.

Sincerely,

James J. Barry, III, Director
Environmental Enhancement & Restoration Division

Attachments

JJB:DB:kfs

*pp 5-10 & 5-11, Shore Protection Manual, Volume 1, Department of the Army, 1994

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(a) Determination of the longshore transport characteristics of the project site and adjacent coast and deficiency of material supply to the problem area.

(b) Determination of the composite average characteristics of the existing beach material, or native sand, in the zone of active littoral movement.

(c) Evaluation and selection of borrow material for the initial beach fill and periodic nourishment, including the determination of any extra amount of borrow material required for placement based on the comparison of the native beach sand and borrow material.

(d) Determination of beach berm elevation and width.

(e) Determination of wave-adjusted foreshore slopes.

(f) Determination of beach-fill transition.

(g) Determination of feeder-beach (stockpile) location.

a. Direction of Longshore Transport and Deficiency of Supply. The methods of determining the predominant direction of longshore transport are outlined in Chapter 4, Section V. The deficiency of the material supply is the rate of loss of beach material--the rate at which the material supply must be increased to balance the transport by littoral forces to prevent net loss. If no natural supply is available as downdrift from a major littoral barrier, the net rate of longshore transport required will approximate the deficiency in supply. A comparison of surveys of accreting or eroding areas over a long period of time is the best method of estimating the longshore transport rate (the nourishment required to maintain stability of the shore). Collecting long-term survey data both before and after project construction is recommended. When surveys suitable for volume measurements are unavailable, approximations computed from changes in the shore position, as determined from aerial photography or other suitable records, are often necessary. *For such computations, the relationship in which 1 square meter of change in beach surface area equals 8 cubic meters of beach material (1 square foot of change in beach surface area equals 1 cubic yard of beach material) appears to provide acceptable values on exposed seacoasts.* This relationship presumes the active beach profile extends over a range in elevation of approximately 8 meters (27 feet). The relationship should be adjusted accordingly for shores with greater or less extensive active beach profiles.

b. Description of Native Beach Sand. It is first necessary to sample and characterize native beach sand to obtain a standard for comparing the suitability of potential borrow sediments. Native sediments constitute those beach materials actively affected by beach processes during a suitable period of time (1-year minimum). During a year, at least two sets of samples should be collected from the surface of the active beach profile which extends from an upper beach elevation of wave-dominated processes seaward to an offshore depth or "seaward limit" of littoral sand movement. Ideally, a "winter" and "summer" beach condition should be sampled. The textural properties of all samples are then combined or averaged to form the native "composite" sample which serves as the native beach textural standard. Textural properties of

native sand are selected for the comparison because they result from the selective winnowing and distribution of sediment across the active profile by sl :face processes; their distribution reflects a state of dynamic equilibrium between sediments and processes within the system. See Hobson (1977) and Hands and Hansen (in preparation, 1985) for specific sampling guidelines, a discussion of composite samples, and a determination of offshore limits for sampling.

c. Selection of Borrow Material. After the characteristics of the native sand and the longshore transport processes in the area are determined, the next step is to select borrow material for beach fill and for periodic nourishment. As explained in the previous paragraph, an average native texture, called the *native composite*, is used to evaluate the suitability of potential borrow sand because the native textural patterns are assumed to be the direct response of sand sorting by natural processes. Simply stated, it is assumed that these same processes will redistribute borrow sand that is placed on the beach in a similar textural pattern as the native sand along the profile considering the differences between native and borrow sand texture. Sorting and winnowing action by waves, tides, and currents will therefore tend to generally transport finer sizes seaward, leave the coarsest sizes slightly shoreward of the plunge point, and cover the beach face and remaining offshore areas with the more medium sand sizes. Some sediment sizes that are in borrow material and not in the native beach sand may not be stable in the beach environment. Extremely fine particle sizes are expected ultimately to be moved offshore and lost from the active littoral zone while fragile grains, such as some shells, will be broken, abraded and possibly lost. These kinds of changes to the borrow sediment will, through time, make the texture of the bea fill more like the original native sediment but will, in the process, reduce the original volume of fill placed on the beach.

Borrow sediments containing organic material or large amounts of the finer sand fractions may be used as beach fill since natural sorting and winnowing processes can be expected to clean the fill material. This has been confirmed with fills containing foreign matter at Anaheim Bay and Imperial Beach, California, and Palm Beach, Florida. Also fill material darkened by organic material (Surfside/Sunset Beach, California) or "reddened" by oxidized clay minerals (Imperial Beach, California) will be bleached quickly by the sun to achieve a more natural beach color. Material finer than that exposed on the natural beach face will, if exposed on the surface during a storm, move to a depth compatible with its size to form nearshore slopes flatter than normal slopes before placement. Fill coarser than the sand on the natural beach will tend to remain on the foreshore and may be expected to produce a steeper beach. However, coarser material moved offshore during storms may not be returned to the beach during poststorm periods. The relationship between grain size and slope is discussed in Chapter 4, Section V,2,f. If borrow sand is very coarse, it will probably be stable under normal as well as more severe conditions, but it may make the beach less desirable for recreational use or as wildlife habitat. If the borrow material is much finer than the native beach material, large amounts will move offshore and be lost from the beach. Angularity and mineral content of the borrow material may also prove important factors in its redistribution, deflation, and the esthetic qualities of the bea

The distribution of grain sizes naturally present on a stable beach represents a state of dynamic equilibrium between the supply and the loss of material of each size. Coarser particles generally have a lower supply rate and a lower loss rate; fine particles are usually more abundant but are rapidly moved alongshore and offshore. Where fill is to be placed on a natural beach that has been relatively stable (i.e., exhibiting a steady rate of change or dynamic stability, or only slowly receding) the size characteristics of the native material can be used to evaluate the suitability of potential borrow material. Borrow material with the same grain-size distribution as the native material is most suitable for fill; material slightly coarser is usually suitable. If such borrow material is available, the volume required for fill may be determined directly from the project dimensions, assuming that only insignificant amounts will be lost through sorting and selective transport and that the sorting is not significantly different from the native material. In cases where these conditions do not apply, an additional volume of fill may be required as determined by an overfill factor.

(1) Overfill Factor. Unfortunately it is often difficult to find economical sources of borrow material with the desired grain-size distribution. When the potential borrow material is finer than the native material, large losses of the beach-fill material often take place immediately following placement. Currently, there is no proven method for computing the amount of overfill required to satisfy project dimensions. Krumbein's (1957) study provides a quantitative basis for comparison on the material characteristics considered to have the greatest effect on this relationship. Subsequent work by Krumbein and James (1965), James (1974), Dean (1974), and James (1975) developed criteria to indicate probable behavior of the borrow material on the beach. The use of the overfill criteria developed by James (1975) will give the best results in the majority of cases. It should be stressed, however, that these techniques have not been fully tested in the field and should be used only as a general indication of possible beach-fill behavior.

The procedures require that enough core samples be taken from the borrow area to adequately describe the composite textural properties throughout the entire volume of the borrow pit (see Hobson, 1977). Textural analyses of borrow and native beach samples can be obtained using either settling or sieving grain-size analysis techniques. The composite grain-size distributions are then used to evaluate borrow sediment suitability.

Almost any offshore borrow source near the shore will include some suitable size material. Since the source will control cost to a major degree, an evaluation of the proportional volume of borrow material with the desired characteristics is important in economic design. The overfill criteria developed by James (1975), presented graphically in Figure 5-3, provide a solution for the overfill factor, R_A, where

R_A = the estimated number of cubic meters of fill material required to produce 1 cubic meter of beach material when the fill is in a condition compatible with the native material,

σ_ϕ = the standard deviation and is a measure of sorting (see Sec. II) where

$$\sigma_\phi = \frac{\left(\phi_{84} - \phi_{16}\right)}{2} \qquad (5\text{-}1)$$

M_ϕ = the phi mean diameter of grain-size distribution (see Ch. 4, Sec. II) where

$$M_\phi = \frac{\left(\phi_{84} + \phi_{16}\right)}{2} \qquad (5\text{-}2)$$

$-_b$ = subscript b refers to borrow material

$-_n$ = subscript n refers to natural sand on beach

ϕ_{84} = 84th percentile in phi units

ϕ_{16} = 16th percentile in phi units

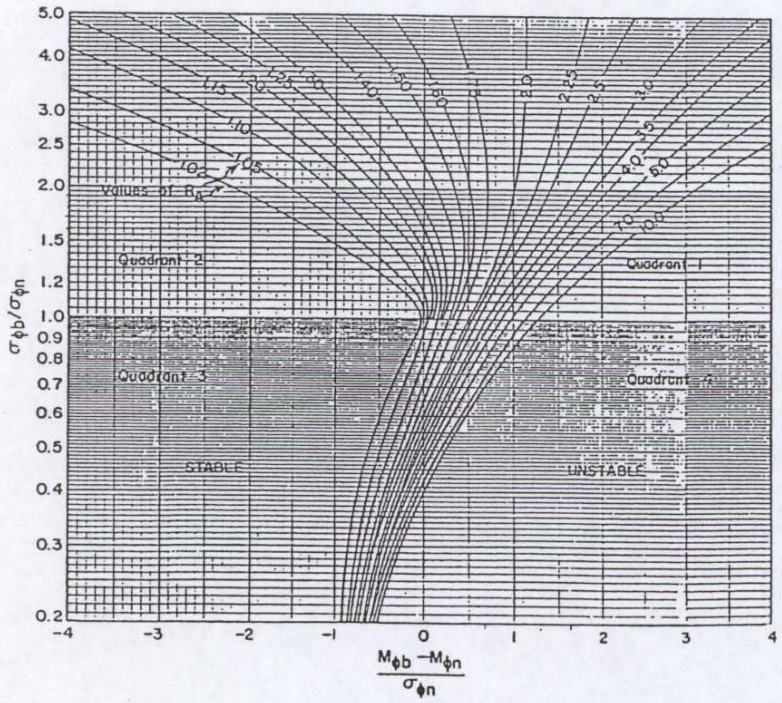

Figure 5-3. Isolines of the adjusted overfill factor, R_A, for values of phi mean difference and phi sorting ratio (from James, 1975).

This technique assumes that both composite native and borrow material distributions are nearly lognormal. This assumption is correct for the composite grain-size distribution of most natural beaches and many borrow materials. Pronounced bimodality or skewness might be encountered in potential borrow sources that contain multiple layers of coarse and fine material, such as clay-sand depositional sequences, or in borrow zones that crosscut flood plain deposits associated with ancient river channels.

The four possible combinations that result from a comparison of the composite grain-size distribution of native material and borrow material are listed in Table 5-1 and indicated as quadrants in Figure 5-3.

The engineering application of the techniques discussed above requires that basic sediment-size data be collected in both the potential borrow area and the native beach area. An estimation of the composite grain-size characteristics of native material should follow the guidelines in Hobson (1977). The determination of the composite distribution of the borrow zone material depends on the variation of materials and their individual properties. If the textural properties of the potential borrow material exhibit considerable variation in both area and depth, extensive coring may be required to obtain reliable estimates of the composite distribution of properties. Since detailed guidelines have not been established for evaluating borrow deposits, it is recommended that core sampling be carried out as a two-phase program—the first phase inventories the general borrow region and the second phase samples in detail those areas with the greatest potential.

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4/25/99

UF study: Beaches are growing

GAINESVILLE — (AP) — When beachgoers in Florida dig their toes in the sand this summer, they may be glad to know that few of the state's shores are in danger of washing away, and some beaches are even growing.

Florida's beaches generally are not falling victim to coastal erosion or steadily rising sea levels, new University of Florida research has found.

In fact, beaches along the Atlantic Ocean are actually experiencing an average increase in size. Beaches on Florida's west coast, along the Gulf of Mexico, are — on average — staying about the same size, the UF study found.

"I think it leads to cautious optimism," said Bob Dean, a UF coastal engineering professor and lead investigator in the study.

Dean and several graduate students analyzed historical and recent shoreline measurement data in Florida's 24 counties with sandy beaches. That includes 12 counties on the Gulf coast and 12 on Atlantic shores.

What the researchers found, Dean said, is that beaches on Florida's east coast are actually growing by a rate of about four inches each year.

Most of the beaches in other Atlantic states are shrinking or disappearing, including Virginia's coast which is retreating as much as 10 feet annually on average, he said.

Several factors are working in Florida's favor, Dean said.

For one, suspended sand in the water travels in a southerly direction along the Eastern Seaboard due to currents generated by northeasterly waves. That makes Florida the natural repository of sand from erosion in more northerly states.

A lot of Florida communities have added sand to their beaches through beach renourishment projects, Dean acknowledged. Even so, he said, Atlantic beaches would have grown without being renourished.

While the trend for most of Florida's Atlantic coast may be expanding beaches, some are eroding rapidly, particularly those located near man-made inlets such as St. Lucie Inlet, Dean said.

Inlets lead to erosion partly because jetties and deep channels disrupt the normal southerly flow of sand, and partly because inlets carry sand away from beaches.

STEN A. LILJA

1330 N. Ocean Blvd.
Palm Beach, Fla. 33480

PRESENTATION AT US Army Corps of Engineers' Public DSEIS Hearing, on 9/12/2002 re. Phipps Ocean Park, in Town of Palm Beach.

I appreciate this opportunity to comment on this EIS process. I shall submit a verbatim copy of this presentation, for the record. It is my concern here, that the Corps might not be cognizant of all information and I feel it to be my obligation to be here, to help provide some facts.

I find the Draft SEIS to be articulate, but failing to sufficiently address what is needed. I find it "empty", as to what it is supposed to provide support for. Others will comment on purely environmental aspects. Therefore, I shall limit myself to commenting on just a few aspects, which provide the very foundation, upon which environmental critique is based.

This EIS contains misstatements of facts, omissions and distortion of facts, which obfuscate the purpose of the EIS. I wish therefore, to bring the following to your attention, so that they shall not be overlooked in your evaluation:

On the first page (iii) of the Executive Summary, the Applicant claims:

"The FDEP has designated all of the Project area, from R-116 to R-126, as an area of "critical erosion". This designation is based on (a) the erosion attributable to the influence of the Lake Worth Inlet and ...."

That statement, IF TRUE, could lead the Corps to conclude that the ENTIRE beach has been found to be critically eroded, thereby inducing the Corps to evaluate the DEP permit on that basis. However, those statements in the Executive Summary of the DSEIS are distorted and/or deceptive. It is important that the Corps be informed about the true facts, AS THE FACTS ARE.

In reality, the beach in this project was declared critically eroded, ONLY down to R-121, a distance of just some 4,700 feet, out the total some 10,200' beach length, down to R-126. To accomodate the Applicant's request for alleged improvement of the project, based on claim of better "Continuity" of the project, the DEP eventually (9 months later) relented and agreed

"to extend the critically eroded shoreline from R-121 through R-124 to

improve continuity and success of the project. This extension of critical erosion area is for continuity and does not result in an extension of the area of influence of the inlet."

Importantly, as the DEP letter demonstrates AS WELL, this is NOT a bona-fide critically eroded beach, NOR did this accomodation constitute eligibility for the one-time, unrestricted State 50% funding for the initial restoration, which was called and designated as mitigation for critically eroded beaches, due to the Inlet. The portion of the project between R-121 and R-124 was subsequently added to that accomodation and the remaining portion between R-124 and R-126 was later included, as well, under the "continuity benefit" concept. While this one-time accomodation WAIVED regular requirement for access, as well as funding dependency on parking and facilities, for beaches down to R-121, the entire stretch between R-121 and R-126 will still, also for the present project, remain subject to access and funding regulations. There can be no doubt, that approx. 55% of the length of the beach in this project has NOT been truly qualified as critically eroded and, therefore, the Corps should be so informed. It is quite revealing, that the Town in its 9/9/1999 request for reconsideration, bases that request on "ineligibility for State funding" RATHER THAN on continuity benefit. If I may say so it raises questions about lobbying.

A different slant on and confirmation of these revelations is found in formally adopted Town funding Resolutions for this project, which show the corresponding lack of State funding; Rather than the widely presumed 50% level of State funding for all of this event, those Resolutions allow here only 22%, which computes with the 55% to 45% ratio of non-critically eroded length of beach. I might add, that the large discrepancy with what is generally presumed to be at the alleged 50% funding level, ought to be revealed to the taxpayers.

Based on what was revealed here, I urge the Corps to NOT approve any restoration between R-121 and R-126, thereby sparing the delicate environmental resources from certain harm, that would come from the effects of un-needed restoration.

-------- X --------

Then there is the cavalier and deceptive application and computation of the Overfill Factor concept, which is applied when estimating how much EXTRA and total fill will be needed, due to inferior sand quality, in order to accomplish the intended beach design profile. In this case, the calculated amount of required overfill, if properly done, would be truly ENORMOUS and would cause catastrophic damage to existing environmental assets.

I have previously submitted to the Corps (and other agencies) a detailed report, entitled "FACTS ARE NOT PRESENTED AS FACTS ARE", which analyses errors and technical consequences from application of huge overfill quantities of inferior fill. I was told at the time, that the Corps would hire outside expertise to evaluate my report. I include my report today, with the written copy of my presentation here. My report is dated 2/19/2001. It is essential that the concerns I have raised in that report, be addressed in this EIS process.

My report was based, in part on a detailed report by two specialist at the Palm Beach County DERM, which rather confirmed my own conclusions, as it pertained to values of Overfill factors, which should be applied to the two different sand sources. I trust that the Corps will re-visit my report and include it with other concerns about this project. I shall take your time here, only to quote from the report's Summary and Conclusion:

"There are not sufficient, nor quality fill sources to satisfy even Initial Restoration, and no fill for subsequent mandated Renourishment, nor for any unforeseen needs. The project is not technically feasible as presented and would cause disasterous damage to the environment."

"the facts are, that OF now is 1.75 for 1/4 of the project and OF for the remaining 3/4 is now 4,0 while the project comes up 40% short of the 800,000 cyds "discounted" design profile volume. This tells us, that the project is non-doable, cannot be predicted, is senseless and irresponsible and would not produce any envisioned profile, but would do enormous and un-predictable amount of damage to the environment."

-------- X --------

As to the Applicant's brief reference to the Overfill Factor, in just 4 lines on page 74 of the DSEIS, I shall make the following observations: Frankly, the Applicant's handling of the subject, is so convoluted, distorted and illogical, as to be impossible to respond to factually, so I shall try instead to apply common sense; By some mysterious computation and through some "back-door" entrance, based on Assumption upon Assumption, the Applicant arrives at what must be understood as some average Overfill Factor of 1.9, as the result of its electing to deposit (only) 1.5 mcyds, which the Applicant, without further calculation or analysis, says would yield 800,000 cyds of "design fill". That conclusion and those volumes emanate from pages 7 and 8 of Coastal Tech's 1/27/00 "Recommended Preliminary Design" (which I include with this presentation). Please read those pages, as they appear rather spectacular in its reasoning and approach. When we examine also the table on page 73 of the DSEIS, as well as that page 7, we find that the Applicant has managed to reduce true .43 m/m mean grain size for the native beach sand, via .395 and down to .34 m/m, which of course would highly affect and distort any computation of an Overfill Factor. It is vitally important that this project NOT "be built on loose sand" so to speak. While calculation of the Overfill Factor is not an exact science, it is the simplest and most important tool available. Let us not make a mockery of it.

What is also spectacular, is the apparant belief that an AVERAGE Overfill Factor can be arrived at and used for two very different mean grain size lots of fill (1.75 and 4.0 resp). Just like socks, one size fits all? Please try to imagine what would happen, when the dredger runs out of the 1.75 OF sand and must switch to the 4.0 variety, as he moves down (or up) the length of the beach and, abruptly, must apply about 2.3 times MORE sand, per linear foot of beach, which of course would result in drastic change in the shoreline. Could you envision a new "plateau" reaching further out in the Ocean? That would be BEFORE Mother Nature washes it away and ruins those environmental assets, which have not yet been buried, during the initial pumping. This must come close to definition of mind-boggling.

One more observation: In the table on page 73 of the DSEIS, there is a foot note (which applies to the proposed burrow sites only) which reads "gravel, course gravel & cobble were excluded in Borrow Area samples for grain size

analysis". This will distort comparison with other grain size values.

I would like to raise the question here, why this is not a programatic EIS ? I was told about a year ago, that a full programatic EIS would be launched. I believe it is essential, that cumulative impacts be considered and organized. I believe that like projects, Inlet to Inlet, should be considered together and not pulled out separately, like the small piece that is being considered here today, as well as those in the future.

Permit me to suggest, that amongst the Corps' three standard alternatives, the No Action alternative is the key and is justified.

Based on what I have tried to explain, I again urge the Corps to reject entirely the part of the project that lies between R-121 and R-126. Don't allow unjustified harm to the environment. If it ain't broke, leave well enough alone.

Thank you for your attention.

Attachements:
Report dated 2/19/2001
DEP letter, dated 6/13/2000
Pages 7 and 8 of Recommended Preliminary Design, dated 1/27/2000
Town of Palm Beach letter, dated 9/9/1999

Department of
Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

June 13, 2000

Al Dusey, P.E.
Director, Public Works
Town of Palm Beach
Post Office Box 2029
Palm Beach, Florida 33480

Dear Mr. Dusey:

Last October, the Department agreed with the Town of Palm Beach to participate in a one-time restoration of beaches downdrift of Lake Worth Inlet to serve as mitigation for inlet impacts. Areas impacted by the inlet were determined to extend from R76-R121, and initial restoration projects within this area would be eligible for 50% state cost sharing. Our staff met with Coastal Technology Corporation on March 22, 2000 to discuss the Phipps Ocean Park Nourishment Project and possible extension of the eligible project area to R126.

Coastal Technology proposed that the Phipps Ocean Park project extend from R116-R126 based on modeling results that demonstrate sand will rapidly shift from R116 to R121 down to a natural headland located at approximately R124-R125. Therefore, the project will benefit with sand placement from R116 through R124. The Department revisited the critically eroded shoreline designation, and based on the information provided, agrees to extend the critically eroded shoreline from R121 through R124 to improve continuity and success of the project. This extension of the critical erosion area is for project continuity and does not result in an extension of the area of influence of the inlet.

If you need any further information, please contact Ms. Jackie Thompson at 850/487-1262, extension 195 or at the letterhead address above, Mail Station 300.

Sincerely,

Alfred B. Devereaux, Jr., Director
Office of Beaches and Coastal Systems

ABD/jt/p

$9.06 million / 1.5 million cu yds = $6.00/yd

With the unit cost of sand estimated for the initial project at $4.50, and assuming 3% allowance for inflation per year, this groin benefit translates into a cost avoidance of approximately $57,000 in year eight. Similar calculations could be made for future 8-year renourishment cycles, but clearly it would take in excess of a typical 50-year project life cycle to recover the $1M+ cost of the groins, which suggests that their use is not cost effective.

A comprehensive evaluation of "T-head" groins was beyond the scope of this report. However, from the negligible benefits predicted by the model results for the simplified, more conventional "straight" groin case, any "T-head" groins would likely have to be extremely long and large to affect the processes sufficiently to hold any substantial amount of beach material.

Borrow Material Effects: The shoreline change modeling described above evaluated a project having a nominal design fill volume of 1 million cubic yards as proposed in the Conceptual Design. The next stage in the design process was to adjust the fill volume to treat the differences in performance which might result from differences in grain size between the borrow and native sand.

The existing native material composite grain size has been measured at 0.395 mm. However, comparisons with the sand grain size on adjacent beaches suggest that this area may be better represented by a grain size of 0.34 mm. The Corps of Engineers conducted a preliminary investigation of native sand along Palm Beach County beaches in 1961. The results of this investigation provide a historical representation of the sand characteristics of the beaches within the area which included this project. According to the results, South Palm Beach County has a mean grain size of 0.34 mm and is moderately sorted. This section of Phipps beach might be characterized as "stressed", having the highest erosion rate of all the Town beaches. It has been observed that beaches in this condition can lose to erosion over time a larger volume of the finer-grained portion of their gradation, and as a result retain only the larger grain size material. For the purposes of this design a grain size of 0.34 mm was used to describe the native sand size. THAT'S WHY DESIGN SHOULD BE .395!

Based on the borrow area geotechnical data provided by CP&E, the proposed borrow area contains sand with smaller composite mean grain sizes (0.22 mm and 0.32 mm) as compared to the native beach (0.34 mm). An "overfill factor", expressed as a ratio, establishes some additional volume of finer-grained borrow material which would be necessary to produce a specific design volume of native beach material. The *Concept Plan* construction volume was

based on an overfill ratio of between 1.0 and 1.2, which essentially assumed the borrow material would be the same size as the native. The actual overfill ratios calculated for the sands in the two sites identified by CP&E is about 1.2 for the 0.32 mm material, and about 3.4 for the 0.22 mm material.

The application of these overfill factors to the design fill of 1 million cubic yards would result in a required total project quantity of about 2.1 million cubic yards. If the total project volume is limited to 1.5 million cubic yards in order to generally stay within the project budget established under the assumptions contained in the Conceptual Design, the result would be to effectively place *less* than the design fill of 1 million cubic yards. After proportioning the calculation for the two different borrow sizes, and assuming all of the 0.32 mm material will be used, the net effect of limiting the cost would be equivalent to placing a design fill of roughly 800,000 cubic yards of native sand. From our modeling experience the practical result would be that slightly more of the northern shoreline of the area would erode back to the existing condition within the 8-year renourishment period. The general geometry of the rest of the shoreline and the *average* performance of the fill would not be dramatically affected by the difference in assumed design volume.

If additional funding can be made available, Coastal Tech supports the placement of additional sand volume up to the calculated 2.1 million cubic yard requirement. However, if the present budget target is preserved, the difference in overall average project performance at the 8-year maintenance point would not be sufficiently great that we would recommend against proceeding with the project because of concerns over excessive losses.

The attached permit sketches illustrate the proposed borrow area cuts for initial construction.

Cross-Shore Profile Adjustment: After the fill is initially placed, the beach will rapidly adjust to come into equilibrium with the ambient bottom conditions, wave climate and composite grain size. For purpose of estimating this adjustment and its effect, the SBEACH model was applied to the anticipated construction fill under the influence of a 15-year return interval storm event. Figure 10 illustrates the projected initial adjustment which is estimated to be a landward migration of the shoreline of about 90 feet at MHW. This adjustment incorporates the effects of moving from an excessively steep initial construction profile to a more "natural" slope, *plus* some of the effect of the fill grain size on establishing that final slope angle. In one sense this might not be viewed as net volumetric erosion, because the original volume will remain in the (submerged) nearshore area. However, because of the

9/16/99 - RJD
Re: Phipps Ocean Park Restoration Project

xc: Mayor and Town Council
Former Shore Protection Board Members
Dusey
Skittone
Pollitt
To: Suspense 9/22/99

TOWN OF PALM BEACH

Public Works Department

RECEIVED
SEP 10 1999
TOWN OF PALM BEACH
MANAGER'S OFFICE

RECEIVED
SEP 15 1999
TOWN CLERK'S OFFICE
TOWN OF
PALM BEACH

September 9, 1999

Dr. Alfred Devereaux, Chief
Office of Beaches and Coastal Systems
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3200

Dear Dr. Devereaux:

We have recently learned that the southern end of the Town's proposed beach restoration project at Phipps Ocean Park was determined to be ineligible for State funding because it is not considered to be critically eroded. We respectfully request a reconsideration of this decision.

Please let us know how to proceed through your appeal process. If you wish to discuss, please call at (561) 838-5440.

Very truly yours,

Albert P. Dusey

Albert P. Dusey, P.E.
Director of Public Works

APD:ms

c: Robert J. Doney, Town Manager ✓
Dave Decker, P.E., Applied Technology & Management
James M. Bowser, P.E., Town Engineer & PW File

MAILING ADDRESS Post Office Box 2029 • 360 South County Road • Palm Beach, Florida 33480 • (561) 838-5440
LOCATION Suite A • 951 Old Blue Heron Road • West Palm Beach, Florida 33401 • Fax (561) 835-4691

Sten A. Lilja

1330 No. Ocean Blvd.
Palm Beach, FL 33480
(561) 844-0612

State of Florida, Dept. of Environmental Protection
Office of the General Counsel
Attention: M.B. Adelson, IV, Senior Assistant General Counsel
3900 Commonwealth Boulevard Mail Station 35
Tallahassee, FL 32399-3000

By Certified Mail, Return Receipt Requested

RE: **NOTICE OF INTENT TO ISSUE, file # 0165332-JC, Palm Beach County, Town of Palm Beach, Phipps Ocean Park Restoration Project.**

Dear Sir:

The attached report, dated February 19, 2001, pertaining to the Phipps Ocean Park Project, is submitted herewith as an addition to my January 4, 2001 Petition for a 90 day extension of time and Supplemental Environmental Impact Study, with the hope that you will find it helpful in your handling of this matter. The intent of my report is to provide analyses and facts, which can assist your experts in the field, to determine the magnitude and potential for environmental damage. Misinterpretation of facts could cause irreversible and permanent harm to the environment. I trust that this report will assist you in deciding that a F.S. Section 120.569 and 120.57 Administrative Hearing must take place. Thank you.

Sincerely

Sten A. Lilja

NOTE: To the recipients of a copy of this letter and the attached report:

Ladies and Gentlemen:

You have shown interest in this serious matter and have made the effort to voice and convey your opinion and concerns. I hope you will find this mailing interesting.

Copies to:

FDEP/OBCS	Dr. Devereaux, Brantley, Seeling, Mille, Murphy
USACOE	Col. May, Hall, Ferrel, McKoy, Griffin
DERM	Walesky, Barry, Bates, Clinger
USFWS	Slack, Simon, Hamilton, Webb
NMFS	Johnson
FWC	Maher
FFWCC	Trindell
USEPA	Hankinson, Fasselt, Kruczinsky, Harvey, Meiburg, Tripp, Murphy, Lindeman
NMFS	Mager
NOAA	Hogarth, Ballew

The Audubon Society of the Everglades
The ReefKeepers International
Florida Division of Historical Resources Snyder Matthews
Town of Palm Beach

Sten A. Lilja

1330 No. Ocean Blvd.
Palm Beach, FL 33480
(561) 848-0148

February 19, 2001

Subject: Florida DEP File No. 0165332-001-JC, Palm Beach County
Town of Palm Beach
Phipps Ocean Park Restoration Project

USACOE, Town of Palm Beach, Phipps Ocean Park
PN 200000380 (IP-DSG)

PHIPPS OCEAN PARK RESTORATION PROJECT;
"FACTS ARE NOT PRESENTED AS FACTS ARE"

INTRODUCTION: It is the purpose of this report to demonstrate the potential damage to the environment that may be inflicted by the quantity and quality of fill proposed for the project. Calculation of fill amounts is needed to demonstrate how large areas of environmental resources will be buried by the fill. The fill quantities may be secondary, but are nevertheless quite interesting. Quantities depend on qualities, so discussion of borrow area proposals are important.

The environmental consequences from the proposed Phipps Restoration Project are far more severe than has been revealed in the Permit Application and supporting documents. There has been major misinformation and disinformation, which have combined to present a false picture. The true extent of the project has not been revealed and the true consequences are, that the destruction of habitats and environmental resources would be much more extensive than envisioned to date. These are the facts:

1. The proposed restoration initially called for a basic profile design volume of 1.0 million cubic yards ("mcyds"). Because the proposed sand sources will provide a fill material which is different from the native beach sand, and does not have the staying capacity of the native beach-sand, there is applied an Overfill Factor ("OF") to determine the extra amount of fill required. Natural forces will sort the fill, leaving only sand of the grain sizes found on the native beach, while washing away those components of the fill, which will not stay on the beach and become part of the profile.

2. Based on OF ratios for the borrow areas, Coastal Tech ("CT") calculated (page #8 of Recommended Preliminary Design) that 2.1 mcyds of fill would be required to provide the intended basic profile. CT concluded, however, that the full 2.1 mcyds of fill may be difficult to extract and the cost would exceed the proposed budget. Therefore, CT "discounted" the project to 1.5 mcyds to stay within budget, but the project would then fall short of the initially intended 1.0 mcyds basic design profile. The 1.5 mcyds of fill would correspond to an 800,000 cubic yard

("cyds") "discounted" basic profile design. 1.5 mcyds of available type fill would provide a berm width of 110-330 feet, with a dry beach width of 180-400' which would, after initial (1 ½ year?) adjustment, shrink by about 90', at MHW (pages #1 and #8 of Recommended Preliminary Design). Those 1.5 mcyds of fill would be collected by first using up all of Area III (because of better material) and the balance to come from Area IV.

3. CT recognized that the cut-back to 1.5 mcyds (from the calculated 2.1 mcyds) would have the consequence that Renourishment (as different from Restoration) would be required in a shorter time than 6-8 years, which is otherwise typical for projects of this kind. It is the harmful effect, which just the INITIAL 1.5 mcyds of fill would have on the environment, that is the basis for the unprecedented amount of objections to this project, by the public, by private organizations and by Government agencies.

4. OFs are derived mainly from grain size and uniformity (sorting) as those characteristics are compared with properties of the native beach sand. The OFs which CT used for the two borrow areas are too low, because the description of the native sand was defective. It may be tempting to choose and use values, which would result in a low OF which, in turn, would translate into less fill and a less costly project (before it is built). Such under-estimation will ultimately result in unplanned harm to the environment and to the pocket book.

5. As stated above, the Application calls for 1.5 mcyds to be taken, first from (the better) Area III and then from Area IV. At the time of the Application, those borrow areas were said to contain 1,004,000 and 2,397,000 cyds, respectively, with presumed OFs of 1.2 and 3.4 The areas were subsequently modified to provide buffer for reef and a pipe.

6. By August of 2000, the applicant had reduced those presumed available gross quantities in borrow Areas III and IV, to 474,966 cyds and 1,990,129 cyds respectively. Without going into detail, it is clear that even with CT's (under-estimated) OF values, there would be insufficient borrow amounts available to satisfy the 1.0 mcyds basic design, now or later. There would be a shortfall of gross fill. Because of difficulties to collect all fill from a borrow site, a margin of 25% is usually reserved, which would then add substantially to that shortfall. Consequently, the Phipps project, as applied for, was no longer feasible, as based on Areas III and IV. That fact, however, if understood by the applicant, has not been conveyed to the public, as of 1/31/01.

7. To make matters worse and the project even less feasible, technically and practically, it was revealed to the public on 7/20/00, that the large percentage of gravel, rock and cobble in both borrow areas could not legally be put on the beach and that the applicant had petitioned the State for Waiver and Variance from the law. The Summary of CT's "Supplementary Geophysical Analysis" of 9/25/00 suggests that each borrow area has "several percent of gravel and cobble content". If the law is upheld and not by-passed by means of political interference, the aforementioned shortfall is exacerbated and the Phipps project, as applied for, is even further from being feasible. The recourse would be to cut back on the project, abandon it, or find some

different source of supply. It should be noted that Coastal Planning & Engineering (CP&E) in its "Offshore Sand Source Investigation", page #47, has recommended that both borrow areas be refined, to improve quality of fill. The core analyses, including the summary tables in the "Supplementary Geophysical Analysis", dated 9/25/00, do not indicate provisions for such refining. The Petition for Waiver and Variance States: "Consulting engineers for the project estimate that even if sorting the material prior to placement were technically feasible, it could ***double*** the cost of the project..." (emphasis added) Cost of screening would be prohibitive.

8. Keep in mind that availability of fill is **NOT THE OBJECT** of this report: It is rather the **DAMAGE** to the environment, that would be caused by the type and amount of fill which would eventually be used for the project. Before going further into the next phase of this report, permit a layman to try to interpret the consequences of the information, up to this point. All information in the foregoing was obtained and derived from CT facts in the Permit Application;

A. Area III will provide 75% of 474,966 cyds =	356,225 cyds net
Area IV can yield total 75% of 1,990,129 cyds =	1,492,597 cyds net
To be taken from Area IV: 1,500,000 - 356,225 =	1,143,775 cyds net

Amount left over in Area IV after 1,500,000 cyds project 348,822 cyds net

B. "Native beach equivalent" volumes for 1,500,000 cyds fill mixture:

From Area III; 356,225 / 1.2 =	296,854 cyds
From Area IV; 1,143,775 / 3.4 =	336,404 cyds
Total	633,258 cyds,

which is well short of the 800,000 cyds "discounted" design profile. **The project is not feasible as presented. 1,500,000 - 633,258 = 866,742 = 58% is amount that will be lost.**

C. If it were elected also to use up the balance from Area IV, the "native beach equivalent." total amount available would be 735,853 cyds, which is still short of the 800,000 cyds "discounted" design volume. It would also mean to "dump" the 1,112,969 cyds balance from the borrow areas, to cause added harm to environmental resources.

D. These "predicaments", which ought to have been known/understood by the applicant, had not been conveyed to the public, as of 1/31/00. It is too late to find out about miscalculations, once the project has been started!

E. Possible solutions are: Reduction of scope, or abandonment. Finding an alternate source of fill would depend on calculation of the cost/benefit ratio of the beach. Public funds should not be wasted on a defective project; one which also would cause great harm to the environment. Funds, State and local, can be put to better use.

F. A further complication and threat to the environment comes from the, as yet not specified in detail, State requirement that Renourishment must take place before the new beach erodes back to where some 40% of the volume has been lost, usually within 6-8 years. Because of the aforementioned major sand quality problems, Renourishment will likely be required in about half the time. Renourishment will cause additional and cumulative harm, at least in parts of the project, or elsewhere. There has been no mention or discussion regarding any ADDITIONAL area that would be covered over and damaged by subsequent fill.

G. The environmental concerns and discussions have concentrated on the LOCATION of the Equilibrated Toe of Fill, as resulting from the Application's 1.5 mcyds of fill which, shall be shown below, was based on erroneous values for fill characteristics. When values, which were determined by Palm Beach County DERM are applied, the estimated location of the Toe of Fill line will be different and, depending on the location of hard bottoms, likely more harmful to the environment. It is left to the experts to determine the extent and location of additional harm that will occur when revised fill amounts in the report are applied. Keep in mind as well, that those subsequent mandated Renourishment(s) (expected after 5-6 years) may cause yet further environmental damage, than has been envisioned to date. AGAIN, the purpose of this report is just to provide corrected computations of the amounts of fill which were, erroneously, presented in the Project Application.

9. As if what has been described so far in this report were not enough, here is part of "The Rest of the Story.": As indicated in Items #4 and #5 above, the calculations of OFs, which were used by CT, were based on defective data. Specialists at Palm Beach County DERM have calculated OF values, which are also supported by their experience and prior work with the Phipps area. Those values are displayed in the attached report, dated 2-14-01. When DERM's OF values are applied to fills from Areas III and IV, or to similar borrow areas, the implications from the environmental point of view, become disastrous. Please compare Item #8, B and C, above.

10. Using DERM's OF values, the net amounts of fill from Areas III and IV, expressed as "native beach equivalent volume" for the 1.5 mcyds fill mixture, can be calculated as follows:

From Area III: 356,225 cyds @ OF = 1.75 would provide	203,557 cyds net
From Area IV: 1,143,775 cyds @ OF = 4.0 would provide	285,943 cyds net
Total	489,501 cyds net

which is, of course, far short of the calculated "discounted" 800,000 cyds design profile volume, and even further from the initially intended 1.0 mcyds basic profile volume.

11. Total maximum available "native beach equivalent volume" from both Areas III and IV would be:

From Area III	203,557 cyds net
From Area IV	373,149 cyds net
Total	576,706 cyds net

which still falls significantly short of both intended basic profile volumes.

12. IMPLICATIONS: While pondering the information in Items 10 and 11, let us NOT FORGET that damage to the environment, as it has been visualized to date, is based on 1.5 mcyds of fill. 633,258 cyds of which (per Item #8B above) might stay on the beach, while the balance of 866,742 cyds would wash away to where it contributes little, if anything, to storm protection. FURTHERMORE, if using DERM's OF values of 1.75 and 4.0, we find that only 489,501 cyds out of the 1,500,000 cyds INITIAL placement might stay, while 1,010,499 cyds would wash away and harm the environment even more, than when using CT's OF values. Remember that Area III has "the least inferior" grain size of ALL listed sources in the Sand Search Report.

13. What does it all add up to and how does it relate to what is being argued today regarding damage to the environment? The Project Application has saddled us with the arbitrary 1.5 mcyds of fill and the damage that the largest part thereof will do, when it escapes from its initial placement. Where will the Equilibrium Toe of Fill end up, and how much hard bottom and habitats will be effected in the process? Please remember that 1.5 mcyds is the already "discounted" compromise form of CT's (already erroneous) estimate of 2.1 mcyds for the Initial Restoration. Common sense tells us that the lower fill amount of 1.5 mcyds would be just the beginning of further damage to the environment. Using up all of the claimed 2,465,085 cyds, less 25% yield factor = 1,848,813 cyds total in Areas III plus IV, cobble, gravel and all, would extend the Toe of Fill farther out than discussed publicly to date, while still providing only a basic profile volume of some 500,000 (489,501) cyds. Any further additions of fill, be it of inferior or of better quality, will just move the Toe of Fill farther out and likely cause additional damage to habitats. Why has not that predictable consequence been visited?

14. What is then the SOLUTION? Common sense tells us to either scrap the project or to minimize the project by putting minimal amounts of sand on the basic public beach. There is no real need to fill anywhere else. If there are still demands for sand on private property (to create recreational beaches), the benefitted owners themselves should go through the permitting process, find sand and pay for it all. There is no basis in the law or precedents to make other residents pay for such amenities, from which they cannot benefit. In the few places where additional measures for storm protection may be required, it is still the property owner's burden to arrange for remedy of a problem which exists because of the property planner's previous neglect. Installing sea walls or adding height to existing sea walls would be more effective storm protection, if that were the true reason for demanding sand today. The notion that the beaches are eroding, is contrary to scientific claims being made today by different sources.

15. It is accepted by professionals, that the portions of new fill which natural forces remove to create as stable a beach as possible, will to a large extent be transferred to submerged areas, where it will provide limited calming effect on storm waves. The fines will be washed out to sea and disappear, while a smaller quantity will get into the lateral transport to other areas. Most of the fill will settle near shore, often on top of habitats and hard bottoms.

16. What has been discussed here, up to now, are the effects and implications of the INITIAL Restoration. While DEP funding conditions call for mandatory maintenance nourishment for at least 10 years and while in the Application and related documents is mention of Renourishment (with perhaps 30 - 40% as much fill again) in less than 8 years (perhaps 5-6 years), there is no plan or discussion, where fill could be found for such mandatory Renourishment. The "Sand Search Report" does not offer any solution. Remarkably, there is no discussion ANYWHERE regarding the additional damage to the environment, which would follow, in a cumulative manner, from subsequent maintenance or Renourishment.

17. There may be a few individuals who were aware of, or have understood, what has been revealed in this report, although at least the Town officials must be aware that they have, formally, executed Town of Palm Beach "Resolution 14-00", on 4/11/00, which authorizes the SECOND HALF of the so called 10-year Plan, which would place some 50-80% additional amounts of fill in Reach #7, over and above what is commonly understood to be the extent of the 10-Year Plan. What has been described in this report are only the effects of the first (INITIAL) half of the Town's 10-year Plan (which includes Phipps), where the second half has, somehow, remained secret. It is time to let the reader form his/her own conclusions from what has been presented here. It is hoped that the presented information, which is based entirely on official facts and data, will provide a quantitative basis, upon which environmental experts can analyze and predict the amount of damage that will emanate from the proposed project, as well as from future acts, which have not been revealed by the Applicant.

18. Finally, is this and other similar proposed projects in the Town of Palm Beach necessary, or is the situation brought on by scare tactics and politics? More and more information and statements are turning up, which all point to the same conclusion, i.e., that the beaches in the Town (as elsewhere) have remained basically stable, for the past some 60 years, with only temporary variations. So, what is then the need to restore? By leaving well enough alone, the environment would not be unnecessarily damaged by unneeded activity. The less the better.

SUMMARY: The project cannot be built as presented in the Application, because of erroneous values for, (a) fill properties and, (b) available volumes. As a consequence, more fill would escape and cause damage to larger areas of environmental resources and habitats, than has been foreseen in the project Application. Trying to add more fill would still not accomplish even the "discounted" design profile, but would cover even more areas and do further harm. There are not sufficient, nor quality fill sources to satisfy even the Initial Restoration, and no fill for subsequent mandated Renourishment, nor for any unforseen needs. The Project is not technically feasible as presented and would cause disastrous damage to the environment.

CONCLUSION: This project, as conceived and described in the 1/31/2000 Permit Application (and still the same as of 12/31/2000) is based on proposed fill with OF = 1.2 for 2/3 of the 1.5 mcyds project. The facts are, that OF now is **1.75 for 1/4** of the project, and OF for the remaining **3/4 is now 4.0,** while the project comes up **40% short** of the 800,000 cyds "discounted" design profile volume.

This tells us that, the project is non-doable, cannot be predicted, is senseless and irresponsible, would not produce any envisioned profile, but would do enormous and un-predictable amount of damage to the environment. How can this project have progressed to the level of "Notice of Intent to Issue"? Who has let this occur?

based on an overfill ratio of between 1.0 and 1.2, which essentially assumed the borrow material would be the same size as the native. The actual overfill ratios calculated for the sands in the two sites identified by CP&E is about 1.2 for the 0.32 mm material, and about 3.4 for the 0.22 mm material.

The application of these overfill factors to the design fill of 1 million cubic yards would result in a required total project quantity of about 2.1 million cubic yards. If the total project volume is limited to 1.5 million cubic yards in order to generally stay within the project budget established under the assumptions contained in the Conceptual Design, the result would be to effectively place *less* than the design fill of 1 million cubic yards. After proportioning the calculation for the two different borrow sizes, and assuming all of the 0.32 mm material will be used, the net effect of limiting the cost would be equivalent to placing a design fill of roughly 800,000 cubic yards of native sand. From our modeling experience the practical result would be that slightly more of the northern shoreline of the area would erode back to the existing condition within the 8-year renourishment period. The general geometry of the rest of the shoreline and the *average* performance of the fill would not be dramatically affected by the difference in assumed design volume.

If additional funding can be made available, Coastal Tech supports the placement of additional sand volume up to the calculated 2.1 million cubic yard requirement. However, if the present budget target is preserved, the difference in overall average project performance at the 8-year maintenance point would not be sufficiently great that we would recommend against proceeding with the project because of concerns over excessive losses.

The attached permit sketches illustrate the proposed borrow area cuts for initial construction.

Cross-Shore Profile Adjustment: After the fill is initially placed, the beach will rapidly adjust to come into equilibrium with the ambient bottom conditions, wave-climate and composite grain size. For purpose of estimating this adjustment and its effect, the SBEACH model was applied to the anticipated construction fill under the influence of a 15-year return interval storm event. Figure 10 illustrates the projected initial adjustment which is estimated to be a landward migration of the shoreline of about 90 feet at MHW. This adjustment incorporates the effects of moving from an excessively steep initial construction profile to a more "natural" slope, *plus* some of the effect of the fill grain size on establishing that final slope angle. In one sense this might not be viewed as net volumetric erosion, because the original volume will remain in the (submerged) nearshore area. However, because of the

including a bathymetric survey, side scan sonar survey and subbottom seismic profiling over 218 line miles. The last phase of field studies included conducting 50 jet probes, and analyzing sediment gradation in 437 sub-samples taken from 94 vibracores.

The seven (7) identified borrow areas lie offshore in water depths of 20.0 feet to 50.0 feet NGVD. Three (3) borrow areas are new sites located as a result of the most recent investigations. Three previous sites have been reanalyzed and one is an enlargement of an existing borrow area. Table 4 lists the volume of sand and grain size characteristics for each of these areas. The total volume of fill material available in the seven borrow areas is 20,609,000 cubic yards. The mean grain sizes within the borrow areas range from 0.32 mm to 0.19 mm. The silt content is typically low, approximately 2% in all borrow areas.

RECOMMENDATIONS

It is recommended that the identified borrow areas be utilized for beach nourishment/ renourishment activities in the Town of Palm Beach. The borrow areas have been defined to incorporate the maximum sand available for permit purposes. It is recommended that in the final design phase for specific beach restoration projects, the borrow areas be refined to obtain maximum fill quality.

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Borrow Area Sampling: The following summarizes observations from sample analysis results for borrow area core samples:

1. Volume of coarse fraction is between
   a) 0.1 and 4.8% per gallon per section
   b) 0.2 and 2.8% per gallon per core

2. Gravel-sized material in the borrow areas (Exhibit 3) is distinguished from that obtained from the native beach (Exhibit 1 and 2) by the presence of:
   a) stick coral (modern) and coral fragments (fossil?; Exhibit 4)
   b) encrusted and fragmented shells (fossil?)

3. The highest gravel values were found in the upper-most section of cores 79 and 94.

4. Cores closest to the relict coral reef terrace (79, 94 and 89) contain the highest coarse fraction, suggesting the sediment is deposited in association with storm induced sediment transport. Clast composition and stratigraphic distribution support this supposition.

5. Borrow Area IV contains less gravel than Area III.

6. To optimize probability of encountering sediment with low gravel content, additional exploration should focus on: (1) areas distal to the reef terrace and (2) proximal or within Borrow Area IV.

V. Summary

This *Supplementary Geotechnical Analysis* provides a quantitative characterization and comparison of the coarse gravel and cobble content within proposed borrow areas and the native beach sands along the fill area of the Phipps Ocean Park Beach Restoration Project. The results suggest the two areas are similar; each containing several percent gravel and cobble content. As there are myriad sources of potential error or variance, quantitative estimates of this sort should be viewed with caution until a more rigorous method of analysis can be developed.

An analysis of potential error introduced during the process of field sampling and laboratory analysis suggests the largest source of error occurs during the process of sieving (Table 4). The native beach is sorted and compacted by "surf beat". Our sampling method disturbs grain-to-grain relationships and re-packs the sediment; the coring procedure also alters grain packing. It is unclear what the net effect of all of these variables has had on this project. Inspection of Table 5 suggests an error of 20% of the sample volume could easily be introduced by sediment compaction during the sieving procedure alone. Discriminating between 2% or 3% is therefore somewhat problematic.

TABLE 4
TOWN OF PALM BEACH BORROW AREA SAND DATA

BORROW AREA	Average Depth of Cut (ft.)	Total Volume (c.y.)	Mean Grain Size (mm)	Silt Content (%)	Phi Sorting
North Inlet Borrow Area	10.0	3,500,000	0.25	1.8%	0.82
South Inlet Borrow Area	10.0	3,560,000	0.25	2.1%	0.95
Secondary South Inlet Borrow Area	10.0	1,205,000	0.25	2.4%	0.98
Borrow Area I	20.0	2,953,805	0.19	1.9%	-
Borrow Area II	20.0	5,989,155	0.19	1.9%	-
Borrow Area III	10.7	1,004,000	0.32	2.3%	1.20
Borrow Area IV	15.7	2,397,000	0.22	1.7%	0.90
		TOTAL C.Y.	20,608,960		

Table 5b - Summary of Grain Size and Gravel Content - Borrow Area III

Core I. D.	Data from Coastal Planning & Engineering: Effective Length (ft.)	PHI Mean	Mean (mm)	PHI Sorting	% Silt	Data by Coastal Tech: Area of Influence (acres)	Total Volume (cy)	Estimated % of Gravel by Volume	Volume of Gravel (cy)
LW93#13 - Composite	15.3	1.46	0.36	1.31	1.90	6.68	184,889	0.0%	0
LW93#15 - Composite	15.8	2.32	0.20	0.64	2.28	0.81	20,572	0.2%	37
LW93#16 - Composite	13.9	2.7	0.15	0.45	1.36	2.97	66,603	0.0%	0
VC99-81 - Composite	12.4	1.9	0.27	1.14	3.92	6.66	133,236	0.4%	533
VC99-84 - Composite	13.2	1.1	0.45	1.48	1.78	4.21	89,656	0.7%	628
Volume Weighted Avg - by Coastal Tech			0.32	1.1	2.4	21.33	474,956	0.3%	1,198

Table 5b - Summary of Grain Size and Gravel Content - Borrow Area IV

Core I. D.	Data from Coastal Planning & Engineering: Effective Length (ft.)	PHI Mean	Mean (mm)	PHI Sorting	% Silt	Data by Coastal Tech: Area of Influence (acres)	Total Volume (cy)	Estimated % of Gravel by Volume	Volume of Gravel (cy)
LW93#19 - Composite	15.0	2.36	0.19	0.88	1.28	9.73	235,466	0.0%	0
LW93#20 - Composite	13.0	2.25	0.21	0.71	2.58	8.15	170,933	0.1%	181
VC99-88 - Composite	16.8	2.4	0.19	1.03	1.50	15.38	411,783	0.1%	412
VC99-89 - Composite	14.2	1.9	0.27	1.07	1.35	24.47	560,591	0.3%	1,682
VC99-90 - Composite	15.3	2.4	0.19	0.95	1.91	24.77	611,356	0.2%	1,223
Volume Weighted Avg - by Coastal Tech			0.22	0.9	1.7	82.49	1,990,129	0.2%	3,497

Table 5c - Summary of Grain Size and Gravel Content - Project

Borrow Area	Effective Length (ft.)	PHI Mean	Mean (mm)	PHI Sorting	% Silt	Area of Influence (acres)	Total Volume (cy)	Estimated % of Gravel by Volume	Volume of Gravel (cy)
III			0.32	1.1	2.4	21.33	474,956	0.3%	1,198
IV			0.22	0.9	1.7	82.49	1,990,129	0.2%	3,497
Volume Weighted Avg - by Coastal Tech			0.24	1.0	1.8	Totals :	2,465,085	0.2%	4,695

Note:
(1) Gravel is defined as material with dimension greater than or equal to 3/4 inches.
(2) Cores from 1993 were not tested in concert with September 26, 2000 Supplementary Geotechnical Analysis; values are adjusted based on average adjustment for tested 1999 cores.

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February 14, 2001

Dr. Sten Lilja
1330 N. Ocean Blvd.
Palm Beach, FL 33408

SUBJECT: PROPOSED SAND SOURCES FOR PHIPPS PARK BEACH NOURISHMENT PROJECT

As requested in your letter of January 25, we have calculated the following overfill factors using the standard methodology recommended by the U.S. Army Corps of Engineers*, native beach sediment information from our 1993 study of the project area and data from the "Supplementary Geotechnical Analysis" from Coastal Tech dated September 25, 2000. It is our understanding that the Coastal Tech data describes the most recent proposal for dredging Borrow areas II & III and that other native beach sediment data was used in the proposed design.

It should be noted that the overfill factor calculation "should be used only as a general indication of possible beach behavior*" A discussion of borrow material and overfill factors copied from the Shore Protection Manual is attached for your review.

Borrow Area III:
Average depth of cut = 10.7 ft
Mean grain size = $M_{\varphi b}$ = 0.32 mm = 1.64 φ
sorting = $\sigma_{\varphi b}$ = 1.10 φ
$(M_{\varphi b} - M_{\varphi n}) / \sigma_{\varphi n} = (1.64-1.25) / 0.57 = 0.68$
$\sigma_{\varphi b}/\sigma_{\varphi n} = 1.10/0.57 = 1.93$
Overfill factor = R_A = 1.75

Borrow Area IV:
Average depth of cut = 15.7 ft
Mean grain size = $M_{\varphi b}$ = 0.22 mm = 2.18 φ
sorting = $\sigma_{\varphi b}$ = 0.90 φ
$(M_{\varphi b} - M_{\varphi n}) / \sigma_{\varphi n} = (2.18-1.25) / 0.57 = 1.63$
$\sigma_{\varphi b}/\sigma_{\varphi n} = 0.90/0.57 = 1.58$
Overfill factor = R_A = 4.0

Your letter questioned whether sufficient fill is available in the proposed borrow areas. In the most current design, it is our understanding that Coastal Tech has

calculated the total volume in the two borrow areas as 2,465,085 cubic yards, of which 1.5 million yards is to be dredged to fill the design template. Information regarding anticipated equilibrium profiles, the calculation of renourishment intervals, sand sources for renourishment and cost/benefit ratios of the proposed plan could probably be obtained from the local project sponsor, the Town of Palm Beach.

Should you have any further questions please contact Daniel Bates at (561) 233-2434.

Sincerely,

James J. Barry, III, Director
Environmental Enhancement & Restoration Division

Attachments

JJB:DB:kfs

*pp 5-10 & 5-11, Shore Protection Manual, Volume 1, Department of the Army, 1994

(a) Determination of the longshore transport characteristics of the project site and adjacent coast and deficiency of material supply to the problem area.

(b) Determination of the composite average characteristics of the existing beach material, or native sand, in the zone of active littoral movement.

(c) Evaluation and selection of borrow material for the initial beach fill and periodic nourishment, including the determination of any extra amount of borrow material required for placement based on the comparison of the native beach sand and borrow material.

(d) Determination of beach berm elevation and width.

(e) Determination of wave-adjusted foreshore slopes.

(f) Determination of beach-fill transition.

(g) Determination of feeder-beach (stockpile) location.

a. Direction of Longshore Transport and Deficiency of Supply. The methods of determining the predominant direction of longshore transport are outlined in Chapter 4, Section V. The deficiency of the material supply is the rate of loss of beach material--the rate at which the material supply must be increased to balance the transport by littoral forces to prevent net loss. If no natural supply is available as downdrift from a major littoral barrier, the net rate of longshore transport required will approximate the deficiency in supply. A comparison of surveys of accreting or eroding areas over a long period of time is the best method of estimating the longshore transport rate (the nourishment required to maintain stability of the shore). Collecting long-term survey data both before and after project construction is recommended. When surveys suitable for volume measurements are unavailable, approximations computed from changes in the shore position, as determined from aerial photography or other suitable records, are often necessary. *For such computations, the relationship in which 1 square meter of change in beach surface area equals 8 cubic meters of beach material (1 square foot of change in beach surface area equals 1 cubic yard of beach material) appears to provide acceptable values on exposed seacoasts.* This relationship presumes the active beach profile extends over a range in elevation of approximately 8 meters (27 feet). The relationship should be adjusted accordingly for shores with greater or less extensive active beach profiles.

b. Description of Native Beach Sand. It is first necessary to sample and characterize native beach sand to obtain a standard for comparing the suitability of potential borrow sediments. Native sediments constitute those beach materials actively affected by beach processes during a suitable period of time (1-year minimum). During a year, at least two sets of samples should be collected from the surface of the active beach profile which extends from an upper beach elevation of wave-dominated processes seaward to an offshore depth or "seaward limit" of littoral sand movement. Ideally, a "winter" and "summer" beach condition should be sampled. The textural properties of all samples are then combined or averaged to form the native "composite" sample which serves as the native beach textural standard. Textural properties of

native sand are selected for the comparison because they result from the active winnowing and distribution of sediment across the active profile by shoreface processes; their distribution reflects a state of dynamic equilibrium between sediments and processes within the system. See Hobson (1977) and Hands and Hansen (in preparation, 1985) for specific sampling guidelines, a discussion of composite samples, and a determination of offshore limits for sampling.

c. Selection of Borrow Material. After the characteristics of the native sand and the longshore transport processes in the area are determined, the next step is to select borrow material for beach fill and for periodic nourishment. As explained in the previous paragraph, an average native texture, called the *native composite*, is used to evaluate the suitability of potential borrow sand because the native textural patterns are assumed to be the direct response of sand sorting by natural processes. Simply stated, it is assumed that these same processes will redistribute borrow sand that is placed on the beach in a similar textural pattern as the native sand along the profile considering the differences between native and borrow sand texture. Sorting and winnowing action by waves, tides, and currents will therefore tend to generally transport finer sizes seaward, leave the coarsest sizes slightly shoreward of the plunge point, and cover the beach face and remaining offshore areas with the more medium sand sizes. Some sediment sizes that are in borrow material and not in the native beach sand may not be stable in the beach environment. Extremely fine particle sizes are expected ultimately to be moved offshore and lost from the active littoral zone while fragile grains, such as some shells, will be broken, abraded and possibly lost. These kinds of changes to the borrow sediment will, through time, make the texture of the beach fill more like the original native sediment but will, in the process, reduce the original volume of fill placed on the beach.

Borrow sediments containing organic material or large amounts of the finer sand fractions may be used as beach fill since natural sorting and winnowing processes can be expected to clean the fill material. This has been confirmed with fills containing foreign matter at Anaheim Bay and Imperial Beach, California, and Palm Beach, Florida. Also fill material darkened by organic material (Surfside/Sunset Beach, California) or "reddened" by oxidized clay minerals (Imperial Beach, California) will be bleached quickly by the sun to achieve a more natural beach color. Material finer than that exposed on the natural beach face will, if exposed on the surface during a storm, move to a depth compatible with its size to form nearshore slopes flatter than normal slopes before placement. Fill coarser than the sand on the natural beach will tend to remain on the foreshore and may be expected to produce a steeper beach. However, coarser material moved offshore during storms may not be returned to the beach during poststorm periods. The relationship between grain size and slope is discussed in Chapter 4, Section V,2,f. If borrow sand is very coarse, it will probably be stable under normal as well as more severe conditions, but it may make the beach less desirable for recreational use or as wildlife habitat. If the borrow material is much finer than the native beach material, large amounts will move offshore and be lost from the beach. Angularity and mineral content of the borrow material may also prove important factors in its redistribution, deflation, and the esthetic qualities of the beach.

The distribution of grain sizes naturally present on a stable beach represents a state of dynamic equilibrium between the supply and the loss of material of each size. Coarser particles generally have a lower supply rate and a lower loss rate; fine particles are usually more abundant but are rapidly moved alongshore and offshore. Where fill is to be placed on a natural beach that has been relatively stable (i.e., exhibiting a steady rate of change or dynamic stability, or only slowly receding) the size characteristics of the native material can be used to evaluate the suitability of potential borrow material. Borrow material with the same grain-size distribution as the native material is most suitable for fill; material slightly coarser is usually suitable. If such borrow material is available, the volume required for fill may be determined directly from the project dimensions, assuming that only insignificant amounts will be lost through sorting and selective transport and that the sorting is not significantly different from the native material. In cases where these conditions do not apply, an additional volume of fill may be required as determined by an overfill factor.

(1) Overfill Factor. Unfortunately it is often difficult to find economical sources of borrow material with the desired grain-size distribution. When the potential borrow material is finer than the native material, large losses of the beach-fill material often take place immediately following placement. Currently, there is no proven method for computing the amount of overfill required to satisfy project dimensions. Krumbein's (1957) study provides a quantitative basis for comparison on the material characteristics considered to have the greatest effect on this relationship. Subsequent work by Krumbein and James (1965), James (1974), Dean (1974), and James (1975) developed criteria to indicate probable behavior of the borrow material on the beach. The use of the overfill criteria developed by James (1975) will give the best results in the majority of cases. It should be stressed, however, that these techniques have not been fully tested in the field and should be used only as a general indication of possible beach-fill behavior.

The procedures require that enough core samples be taken from the borrow area to adequately describe the composite textural properties throughout the entire volume of the borrow pit (see Hobson, 1977). Textural analyses of both borrow and native beach samples can be obtained using either settling or sieving grain-size analysis techniques. The composite grain-size distributions are then used to evaluate borrow sediment suitability.

Almost any offshore borrow source near the shore will include some suitable size material. Since the source will control cost to a major degree, an evaluation of the proportional volume of borrow material with the desired characteristics is important in economic design. The overfill criteria developed by James (1975), presented graphically in Figure 5-3, is a solution for the overfill factor, R_A, where

R_A = the estimated number of cubic meters of fill material required to produce 1 cubic meter of beach material when the fill is in a condition compatible with the native material,

σ_ϕ = the standard deviation and is a measure of sorting (see Sec. II) where

$$\sigma_\phi = \frac{(\phi_{84} - \phi_{16})}{2} \qquad (5\text{-}1)$$

M_ϕ = the phi mean diameter of grain-size distribution (see Ch. 4, Sec. II) where

$$M_\phi = \frac{(\phi_{84} + \phi_{16})}{2} \qquad (5\text{-}2)$$

$-_b$ = subscript b refers to borrow material

$-_n$ = subscript n refers to natural sand on beach

ϕ_{84} = 84th percentile in phi units

ϕ_{16} = 16th percentile in phi units

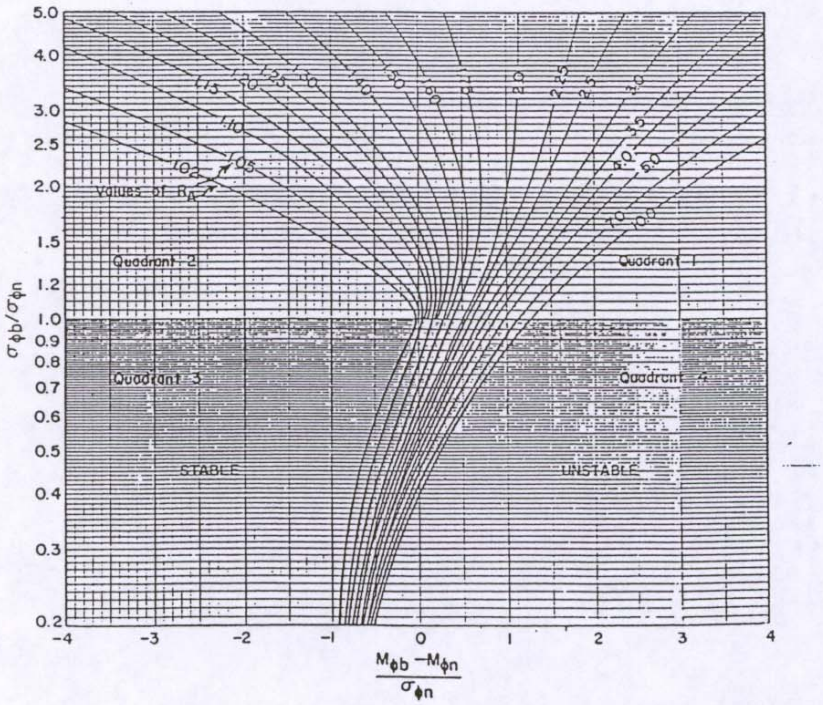

Figure 5-3. Isolines of the adjusted overfill factor, R_A, for values of phi mean difference and phi sorting ratio (from James, 1975).

This technique assumes that both composite native and borrow material distributions are nearly lognormal. This assumption is correct for the composite grain-size distribution of most natural beaches and many borrow materials. Pronounced bimodality or skewness might be encountered in potential borrow sources that contain multiple layers of coarse and fine material, such as clay-sand depositional sequences, or in borrow zones that crosscut flood plain deposits associated with ancient river channels.

The four possible combinations that result from a comparison of the composite grain-size distribution of native material and borrow material are listed in Table 5-1 and indicated as quadrants in Figure 5-3.

The engineering application of the techniques discussed above requires that basic sediment-size data be collected in both the potential borrow area and the native beach area. An estimation of the composite grain-size characteristics of native material should follow the guidelines in Hobson (1977). The determination of the composite distribution of the borrow zone material depends on the variation of materials and their individual properties. If the textural properties of the potential borrow material exhibit considerable variation in both area and depth, extensive coring may be required to obtain reliable estimates of the composite distribution of properties. Since detailed guidelines have not been established for evaluating borrow deposits, it is recommended that core sampling be carried out as a two-phase program—the first phase inventories the general borrow region and the second phase samples in detail those areas with the greatest potential.

4/25/99

UF study: Beaches are growing

GAINESVILLE — (AP) — When beachgoers in Florida dig their toes in the sand this summer, they may be glad to know that few of the state's shores are in danger of washing away, and some beaches are even growing.

Florida's beaches generally are not falling victim to coastal erosion or steadily rising sea levels, new University of Florida research has found.

In fact, beaches along the Atlantic Ocean are actually experiencing an average increase in size. Beaches on Florida's west coast, along the Gulf of Mexico, are — on average — staying about the same size, the UF study found.

"I think it leads to cautious optimism," said Bob Dean, a UF coastal engineering professor and lead investigator in the study.

Dean and several graduate students analyzed historical and recent shoreline measurement data in Florida's 24 counties with sandy beaches. That includes 12 counties on the Gulf coast and 12 on Atlantic shores.

What the researchers found, Dean said, is that beaches on Florida's east coast are actually growing by a rate of about four inches each year.

Most of the beaches in other Atlantic states are shrinking or disappearing, including Virginia's coast which is retreating as much as 10 feet annually on average, he said.

Several factors are working in Florida's favor, Dean said.

For one, suspended sand in the water travels in a southerly direction along the Eastern Seaboard due to currents generated by northeasterly waves. That makes Florida the natural repository of sand from erosion in more northerly states.

A lot of Florida communities have added sand to their beaches through beach renourishment projects, Dean acknowledged. Even so, he said, Atlantic beaches would have grown without being renourished.

While the trend for most of Florida's Atlantic coast may be expanding beaches, some are eroding rapidly, particularly those located near man-made inlets such as St. Lucie Inlet, Dean said.

Inlets lead to erosion partly because jetties and deep channels disrupt the normal southerly flow of sand, and partly because inlets carry sand away from beaches.